The Communicator

July—August 2021

SARC

A Publication Of Surrey Amateur Radio Communications

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The Communicator is a publication of Surrey Amateur Radio Communications.

It appears bi-monthly, on odd-numbered months, for area Amateur Radio operators and beyond, to enhance the exchange of information and to promote ham radio activity.

During non-publication months we encourage you to visit the Digital Communicator at **ve7sar.blogspot.ca**, which includes recent news, past issues of The Communicator, our history, photos, videos and other information.

To subscribe, unsubscribe or change your address for e-mail delivery of this newsletter, notify **communicator @ ve7sar.net**

Regular readers who are not SARC members are invited to contribute a $5 annual donation towards our Field Day fund via PayPal.

SARC maintains a website at **www.ve7sar.net**

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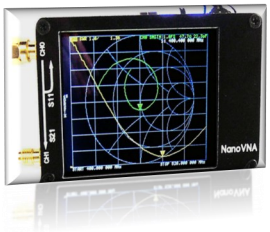

Measurements with the NanoVNA—Part 3

QRM -- --.-- .--. --

...from the Editor's Shack

Do you have a photo or bit of Ham news to share? An Interesting link?

Something to sell or something you are looking for?
*eMail it to **communicator at ve7sar.net** for inclusion in this publication.*

Well another Amateur Radio season is drawing to a close. It has been unusual in that we have not been able to meet in person for 16 months but there seems to be some light at the end of the tunnel. Hopefully its not a train as some have predicted that COVID variants pose a threat for some time to come.

Here in British Columbia we are on track for a re-opening and an 'almost back to normal' by Labour Day on September 6th. If that prediction holds true, we will resume in-person meetings, classroom Basic and CW courses. Our Saturday morning Koffee Klatch is back now at Denny's Restaurant, 6850 King George Blvd., Surrey. There will be an opportunity on our regular July and August meeting nights to get together at the OTC for an informal session. The extent of COVID requirements at the time will dictate how 'informal' we can get.

Your Directors have decided that we will have a presence at the OTC on Saturday mornings going forward, so drop by if you like. In the planning is a trunk sale at the OTC. The trunk sale will be an opportunity to bring your good used gear to find a new home to potential buyers, especially the recent course grads. Saturday, September 4 has been suggested as the sale date for members only and it would be opened up to the ham community in general on the following Saturday, September 10th.

Enjoy this summer, it is certainly starting out hot for us locally. See you in the September issue.

73,

~ John VE7TI, Editor
communicator@ve7sar.net

This Month's Issue...

Field Day 2021 was a success thanks to the SARC and SEPAR volunteers that made it happen. COVID restrictions and record high temperatures made it a reral challenge this year but we fielded two group stations.

Communication works for those who work at it.—*John Powell*

On the Web

ve7sar.net

Between newsletters, watch your e-mail for news, announcements of Amateur Radio events, monthly meetings and training opportunities.

Click the links below to follow our presence on the web and social media:

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ve7sar.blogspot.ca

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Our YouTube Channel
SurreyARC

SARC Photo Albums
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or

tinyurl.com/SARCphoto

The Rest Of The Story…

The story of Zenith radio

Eugene F. McDonald

Eugene F. McDonald (1886–1958) founded Zenith Radio in 1921, a major American radio and electronics manufacturer for most of the twentieth century.

Early life

Eugene F. McDonald Jr. was born March 11, 1886 in Syracuse, New York, the son of Frazier McDonald and Betty May Thompson McDonald. He earned his first money while a schoolboy by reading electric meters. School did not appeal to McDonald, and at the end of his sophomore year in high school he left school to take a factory job with the Franklin Automobile Company.

Moving to Chicago in 1904, he became an automobile salesman with the Franklin Auto Company and, as a publicity stunt, once drove a car up the steps of the General John Logan Memorial in Grant Park—with a photographer present and a policeman there to arrest him. He paid the policeman $10 for the arrest. In 1904, he began working for the company in Syracuse. He quickly rose in the sales and promotion areas and made a name for himself. In 1910, he moved back to Chicago to join a speculative business of a friend of his who wished to manufacture an automobile self-starter. The business did not succeed and McDonald lost his investment.

In 1911, he was in partnership in Detroit selling used cars, and by the end of 1912 had begun a credit finance company for the purchase of new and used cars, a commodity that had previously not been available on credit. He was the first to offer working people a payment plan for the purchase of an automobile.

Military service

When the United States entered World War I in 1917, he enlisted in the Naval intelligence service and eventually became a lieutenant commander. His commission came about as he understood the operation a device used in the Navy for recording radio and telephone conversations – the 'telegraphone' – and the manufacturer was no longer in business. He remained in the service until 1919 but continued service in the U.S.N.R.F. (US Naval Reserve Forces) until 1939. He kept the title of lieutenant commander for the rest of his life, having retired at the rank from the USNR.

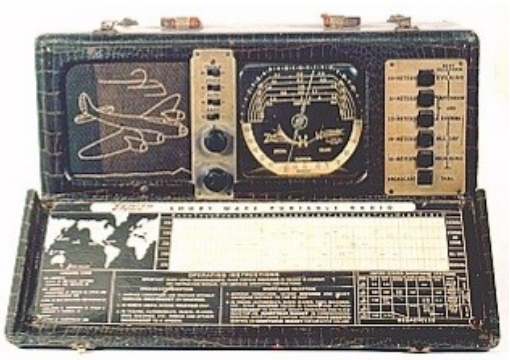
Founding of Zenith Radio Corporation

He joined with Ralph Matthews and Karl Hassel, the three of them incorporating the Zenith Corporation (formerly Chicago Radio Labs) in 1923. From the call letters of their amateur station, 9ZN, they developed the trade name of ZN-th. The company survived the Great Depression and was soon the leader of radio manufacturers. At the same time McDonald launched a career as an explorer and adventurer that publicized the Zenith products and sent sales to new records.

He formed and was the first president of the National Association of Broadcasters and pioneered the development of the short-wave radio. When Donald B. MacMillan made his Arctic trip he was equipped with transmitters and receivers supplied by the Zenith Corporation. “He expanded the radio medium into international communications, ship-to-shore, radar, and VHF and UHF television.” The company slogan was: “The quality goes in before the name goes on."

The Zenith Corporation was a great company and a good example to others. During the Great Depression, Zenith employees took less pay and worked longer hours to keep the company alive. As the economy improved, Comdr. McDonald rewarded them with additional shares in the company and a larger portion of its profits.

He became interested in the radio business in 1920 upon learning that there was money to be made in it. However, it was necessary to hold a manufacturing license from Edwin Armstrong - and issuance of these had been suspended indefinitely. However, in 1921 he entered into a partnership with the founders of the Chicago Radio Laboratory, Karl Hassel, and Ralph Matthews. Under the tradename "Z-nith", this company held a valuable Armstrong license but lacked funds for expansion to meet the demands of their order book.



The Zenith 7G605 Trans-Oceanic Clipper 1941-1942

McDonald was appointed general manager and the partnership was formally incorporated in 1923 as the Zenith Radio Corporation. By 1927, the company was large enough to secure its own RCA manufacturing license. McDonald was well known for his charismatic leadership style, and his unexpected death in 1958 reportedly "left a void of talent at the top" of the company.

Brief summary

Eugene McDonald, besides being a hard-driving and demanding CEO, was also a yachtsman. His yacht the Mizpah (AKA USS Mizpah (PY-29)) was one of the largest in the Great Lakes region. Toward the end of 1939 the interest in the war in Europe increased. McDonald had poor reception of any regional broadcast aboard the Mizpah and suggested that a portable radio be produced that could receive not only standard broadcast (AM radio) but higher-frequency shortwave broadcast to receive international broadcasts that use radio frequencies that could bounce off the Earth's ionosphere (upper atmosphere) and travel great distances.

One of the big obstacles to design such a radio was that vacuum tubes in the 1930s and 1940s had trouble operating at higher frequencies using battery power supplies which were lower voltage than AC-operated designs. In late 1941 after many rejects by McDonald (who personally did the testing on his yacht). Zenith Radio

LEFT: The Royal 2000 Tran-Symphony (1960), First American FM/AM Portable
RIGHT: The Royal 1000 Trans-Oceanic (1957) - First Transistor Portable Multiband Radio

engineers Gustaffson, Passow, Striker and Emde came up with the model 7G605 "Clipper", that was met with approval by McDonald after stringent testing. Zenith advertised this new product extensively, including loaning or giving one to a celebrity or well-known individual to try and evaluate. Zenith made electronics and radio history by producing the first totally portable multiband radio designed for standard and shortwave broadcast listening. Zenith went into production in 1942, but the US entry into World War II put a production halt to the "Clipper". Although no new consumer Trans-Oceanics were made, Zenith provided them for the war effort and continued to advertise and promote the Trans-Oceanic during World War II. Very few were produced (35,000), and not very many are in service presently, which makes this a very rare item.

In December 1957, Eugene McDonald and Zenith engineers put Zenith Radio back into the news with the world's first portable transistorized multiband radio, the Royal 1000 Trans-Oceanic. McDonald was personally involved with its conception and manufacture, as he was in the development of the 7G605 "Clipper" The Royal 1000 like the "Clipper" was designed for standard and shortwave broadcast reception. The quality construction and engineering design efforts, a Zenith trademark were mechanically and electronically demonstrated in this model.

This was McDonald's last major involvement with Zenith as he died the following year.

The Trans-Oceanic is considered by many the best-designed mass-produced portable radio made. Zenith for the most part, until the end of the model line, used the latest cost-effective technology advances and materials in Trans-Oceanics. The Trans-Oceanic model line ran from 1942 to 1982. For years it was the top selling "high-end" portable multiband radio until it was finally eclipsed by Sony with their digital tuning ICF-2001 and ICF2010 in the 1980s, which put the Trans-Oceanic out of business.

Zenith introduces the television remote control

RCA's promoting radio manufacturers to build televisions with its no royalty policy got Zenith Radio into the TV business during the end of the 1940s. McDonald, whose aversion to commercials was well-known, wanted Zenith to produce and sell a remote control.

In 1950 Zenith came up with a remote control called the "Lazy Bones" which was connected with wires to the TV set. The next development was the "Flashmatic" (1955), designed by Eugene Polley, a wireless remote control that used a light beam to signal the TV (with a photosensitive pickup device) to change stations. One problem was that during the daytime the sensitivity degraded. In 1956 Zenith began producing a remote control named after McDonald's nickname "The Commander" and calling it the "Space Command". This new technology worked by sending an ultrasonic tone to the TV set, where it was picked up with a miniature microphone sensitive to only that tone. At the cost of $259.95, it was truly a luxury item

Public notices of family life

McDonald married the former Inez Riddle but they divorced in 1947. In 1962, four years after the commander's death, his former wife Inez Riddle McDonald Neale sought to have the divorce set aside. There was a long and ugly trial played out in the local newspapers. The children sided with the mother but she was finally denied her request. The McDonald estate was estimated to be worth $30 million, but there were also lower estimates. Details of the decision were (McDonald v Neale) filed in 1962. It was ruled against claims his former wife petitioned for. The Illinois court ruling can be seen at this link McDonald Jr vs Neale.

There were two children born to the marriage: daughter Jean Marianne and son Eugene McDonald III. The son was known as "Stormy" died from a self-inflicted gunshot wound on February 6, 1965. His body was brought back to Chicago from Arizona, where a funeral service was conducted. Prior to his death he was briefly married to Virginia Baker. For details transcribed from the Arizona Daily Star newspaper go to the link The Stormy McDonald Mystery.

Zenith Radio Advertisement for "Lazy Bones" remote control, 1951

Another article written a year later (February 13, 1966) from the Reading Eagle newspaper with photos of Eugene McDonald III and his mother Inez Riddle McDonald Neale can be seen at this link The Boy Who Had Everything.

And that is history.

~

Social Reminder

The Saturday SARC weekly social gathering is once again 'on' at the Denny's Restaurant, 6850 King George Blvd., Surrey BC from 07:30—09:30. Afterwards, we will host workshops at the OTC from 10-noon. Bring your ham issues, we'll try to help you sort them out.

A look back into the time web's time machine...

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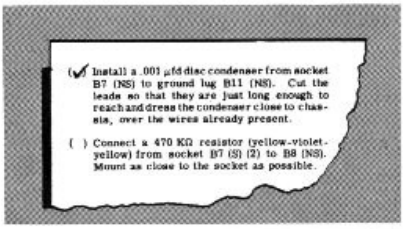

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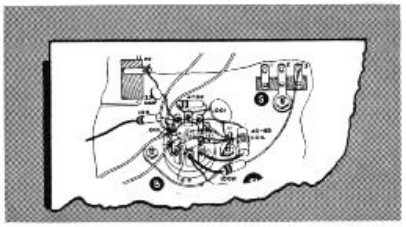
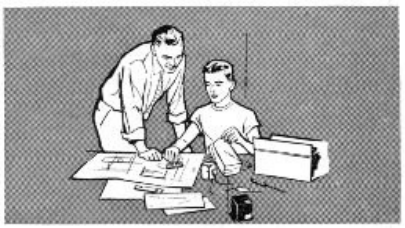


Easy-to-follow Pictorial Diagrams . . .
Detailed pictorial diagrams in your Heathkit construction manual show where each and every wire and part is to be placed.



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Emergency Comms

Ham Radio Making A Difference

Tom Cox VE6TOX

Why do you need ICS? - Part one

The Incident Command System (ICS) is the single best incident management system. That is not to say ICS doesn't have limitations, challenges, and flaws. Yet, for everyone who says "ICS doesn't work", you must then ask, "What is your alternative?" If there is no alternative, let alone any better alternative, then ICS must be the incident management system of choice.

All-Hazards

One of the first misunderstandings of ICS is that it appears to be a system designed for wildland fire incidents. This is because ICS was created in response to a series of overwhelming fires in California where the response systems clearly broke down and because it was the wildland fire fighters that were the first to use it and see its value. The history says "wildfire", the use seems to be "wildfire", and the pictures in the training materials were "wildfire". But it was never a wildfire system.

The task force which created ICS recognized, right from the start, that the characteristics of a massive wildfire are the exact same characteristics of a riot, a nuclear melt-down, a pandemic, or a train derailment. ICS must be able to deal with anything a firefighter might have to respond to in their career, from a cat up a tree to the World Trade Center attack. Although they were firefighters, they specifically stated that the system must be created to handle all hazards.

From the BP Deepwater Horizon oil spill, any hurricane or tornado you can name, from river blockages in British Columbia, to invasive zebra mussels in Montana, to animal disease outbreaks and moving hospitals, ICS was designed to work for any emergency organization, any hazard, and any size of incident. It doesn't matter what the emergency, ICS works.

Lessons Learned

Most organizations talk about "lessons learned" and "best practices". They wouldn't recognize lessons learned if it was staring them in the face. Literally. Every time you look an ICS organization chart, you see positions to be filled and relationships. I see the best lessons learned ever written. Every single box on the ICS organization chart fixes a response problem that exists or potentially

Tom Cox (VE6TOX) is the Senior ICS Consultant with the Alberta Emergency Management Agency and a Master Instructor with ICS Canada.

He has taught over 400 ICS instructors in Canada, conducts professional development workshops across North America and has written extensively on ICS and ICS instruction.

He received his first ICS training as a volunteer with the City of Vancouver and the Vancouver Emergency Communication Telecommunications Organization (VECTOR).

exists if ignored. The seven most experienced fire organizations in California that comprised the FIRESCOPE[1] team that designed ICS spent three years identifying everything that goes wrong on incidents. When any incident response or any other system fails, you will see that the solution was already provided on the ICS organization chart. ICS doesn't say "Fill every box." It says "These are the solutions to every response problem. Who fixes that problem depends on the complexity of the incident and the staffing on the organization chart."

System, not a List

ICS is a system; it was designed as a system, works as a system, and fails when all parts of the system aren't included. But organizations and ICS instructors teach everyone as if it was a list – a menu to pick and choose the parts you like and ignore anything you don't like (or more often don't understand). I teach instructors that ICS is like a car. If you don't like the look of the wheels or understand the need for the pistons, throwing out those pieces means the whole system doesn't work. Most organizations trying to use ICS try to "ease into it" by only adopting or using the parts they are comfortable with. When ICS doesn't work as intended, they exclaim "ICS doesn't work for us!" Like the car without pistons, they don't see how all parts must be there. This means that ICS is harder to learn because what appears to be superficial or unnecessary must be understood rather than simply removed.

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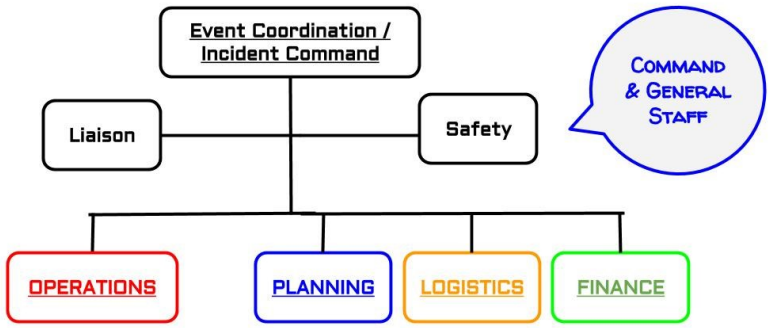
[1] *Firefighting Resources of California Organized for Potential Emergencies*



Interoperability

Everyone in emergency management wants simple solutions to complex problems. There are no happy answers in emergency management. Pandemic restrictions versus individual rights. Economy versus public health. Emergency warnings too early or too late. Here is one of the great trade-offs of ICS: ICS is less efficient than any system you designed solely for your organization or discipline. If it is less efficient, then why use it? Because it is the most efficient system in any situation where you need help from any outside individuals, organizations, or disciplines.

It works on small incidents, like a car crash or a medical emergency, but when you and your partner are the only two on scene, the entire organization chart, ICS-specific forms, and defined terminology are foreign and uncomfortable. It is a struggle to use. It is important to note that small incidents make up 95 to 98% emergency responses.

During large-scale emergencies and disasters, ICS shines. It is during large-scale disasters that we see the greatest loss of life and property, long-term impacts to the environment, and community recovery and mental health issues that may linger for decades. No organization can handle the "big bad ones" on their own. This is exactly the situation where ICS works best. ICS was never meant for you and your organization. It was meant for everyone coming to help you. It was meant that everyone coming knows exactly what needs to be done, how to integrate immediately, how to communicate, and how to get into the most efficient rhythm to resolve the incident.

If you want anyone to help you or you to be able to help anyone else, then ICS is the requirement.

ICS uses a standard system of naming sections and the positions within those sections.

ICS Doesn't Tell Anyone How to do their Job

I was working with the RCMP (Royal Canadian Mounted Police) providing ICS training to their senior leadership and the organizer said "ICS won't work for us". I asked why not and he explained how they had their own system called "Major Case Management". I asked him to whiteboard how an incident would be approached and resolved. When he was done, I simply walked over to the whiteboard and wrote the ICS terminology beside every single item on the board. "You're already doing ICS", I said.

ICS does not tell you or anyone how to do your job. ICS does not tell you how to operate your radio, it doesn't tell police the way to best respond to a riot, or tell a firefighter that they must us water even if it is a magnesium fire. ICS is used to achieve the most effective, efficient and safe response to an incident. You know what you are doing. ICS coordinates your efforts so you aren't tripping over each other, nobody gets missed, everyone understands what needs to be done, and everyone goes home safe. If ICS starts telling utility workers, aircraft controllers, or evacuation centre managers how to do their job, then it is being misused. Leave the tactics to the people in the Operations Section who already know what they need to do and how to do it.

There is no "Modified ICS"

Anyone who tries to modify ICS doesn't understand it. They don't understand its internal structure, they don't understand what each box on the organization chart does and they don't understand that it isn't telling you how to do your job. The top experts in ICS are constantly derided as being "purists". Someone who has taken an I-200 course or an agency executive administrator with no experience with ICS will accuse someone with twenty years of experience with ICS of "not understanding it". Then they proceed to modify it.

Invariably this is because they don't recognize it is a system, it is a struggle to apply to small single-organization responses, is not tactical direction, and haven't used it enough. If you have never needed to have dozens or hundreds of outside individuals come to help you, it is no surprise that you want to modify it.

There is one slide in the ICS course that causes a world of problems. It states "Remember – ICS is flexible". That is incomplete and incorrect. It should state "ICS is flexible to the needs of the incident, not to your organization." Everyone quotes that slide as they try to make ICS look like their day-to-day organizational structure, business units, and functions. But every change reduces the effectiveness of ICS and makes it less usable or unusable by anyone coming to help you – which defeats the entire purpose of ICS. When you use ICS, you must take all of it or none of it. There is nothing in-between.

Which is why the purists consider being derided as "purists" consider it the highest complement you could give them.

Users versus Administrators

Ever since the first incident where ICS has been used, those trained in the system and out in the field have said "It was a little strange at first, but it worked." The spread of ICS around the world (it is now used in over sixty countries in one form or another), has always been because of the "boots on the ground" seeing it in action and having an "Aha!" moment that they never lose. Any administrator or leader can order those below them to take ICS training and claim they are using ICS. Anyone who uses ICS for real struggles the first few times and then never goes back. For over fifty years, it has been those who use ICS that have forced those above them to switch. Which is funny, because ICS is fifty years of lessons learned and best practices put together in the worlds most efficient and effective incident management system and people still don't want to use it.

Up next...

2. What to know to make ICS work
3. Four uses of ICS – from events to disasters
4. Communications Failures and ICS
5. Supporting emergencies
6. Supporting disasters

~ Tom VE6TOX

Page 12–News You Can't Lose

RAC Canadian Portable Operations Challenge Award

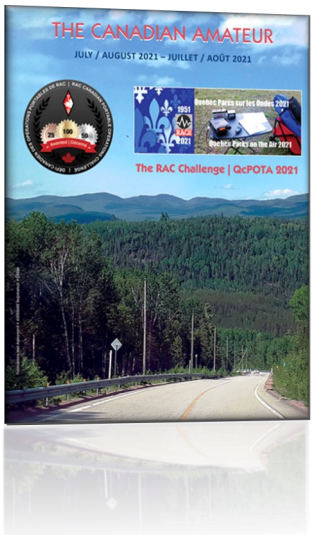
Overview

Radio Amateurs of Canada presents a new Canadian Portable Operations Challenge Award for RAC members. The objective of the new "RAC Challenge Award" is to recognize and encourage portable operations by RAC members from locations throughout Canada. The new program will begin on Canada Day, July 1, 2021 and we hope it will become an annual event for RAC members.

The following information is still tentative as the new Awards program is still being organized, so please stay tuned to this webpage for future updates.

Portable Operations: Portable operations are those in which Amateurs take their equipment, antennas and power supply to a location away from their home station to operate. This includes mobile stations, backpackers, DXpeditions and participation in events such as those described below:

RAC TCA Magazine



Parks On The Air (POTA), a worldwide program of park activations - https://parksontheair.com/.

Quebec Parks On The Air (QcPOTA) April 1 to December 31; Field Day: June 26-27

There are several other programs that celebrate portable operations including Summits on the Air (SOTA), Islands on the Air (IOTA) and the International Lighthouses and Lightships Weekend.

Features of the "RAC Challenge"

The new "RAC Challenge" will recognize all portable operations in which RAC members participate and will have similar features as a contest. Amateur Radio contests in VHF, UHF and the Microwave bands all have categories for "Rovers" – who move from grid square to grid square and "Backpackers" – who seek out hilltops from which to operate with highly portable equipment and antennas.

For many satellite operators, making contact with as many grid squares as possible is a mark of success. Some of those operators go on satellite DXpeditions to activate rare grids or operate from the intersections of grids to offer multiple grids with a single contact. In addition to being fun, these activities provide an opportunity for Amateurs to experience what is required to set up and operate under challenging conditions – valuable experience for emergency preparedness.

For more on the RAC Challenge Award, please see https://www.rac.ca/rac-canadian-portable-operations-challenge-award/

~ *RAC*

Page 13–News You Can Lose

The Lighter Side of Amateur Radio

Own this frequency?

PORT O' GLOOM, GEORGIA — A Chickasaw County man has become the first amateur radio operator to officially purchase an HF radio frequency, the Federal Communications Commission announced today in a noon hour media luncheon.

Between bites of cucumber sandwiches and small squares of bread slathered with pimento cheese, FCC spokesman Pontus "Smokey" Blumenthal told reporters gathered at the Tri-County Technical College dining hall that the sale is "…part of the government's plan to generate revenue from 'under-performing' slices of the radio spectrum."

Using a lottery system, local ham radio operator Buzz Sanders (175 Fisherman's Landing), accepted purchase of 14.281 MHz in the 20 meter amateur radio band.

A retired auto industry worker, Sanders says he'll pay $2500 for the frequency over 35 monthly payments with a large balloon payment in month 36.

"It seemed like a fair deal to me," he said. "When I get ready to work a contest, have a rag chew, want to tune up on the air, or just create some random QRM, I can use 14.281. And if someone gets belligerent, I'll remind them that as a matter of fact I DO own the frequency!"

Sanders says he's already thinking about subletting the frequency after several large contesting organizations contacted him in recent days.

Blumenthal shared that the FCC is also considering a "lease-to-own" frequency program, with the option to return the frequency to the government at the end of the lease term if propagation isn't suitable to the operator.

~ WBØRUR, on the scene

Radio Ramblings

Kevin McQuiggin VE7ZD/KN7Q

Recent Activities at VE7ZD

Well, here we are at the last column of the 2020/21 season. The pandemic looks to be coming under control in most parts of the world, so hopefully you and your families and friends will have some fun over the summer and be able to get together and enjoy the good weather. Solar cycle 25 is now on the upswing, so that'll be good for amateur radio operations as well.

This month I'd like to cover several activities of interest (both successes and failures) and report on some recent developments that you as a member of SARC might want to get involved with.

Research Collaboration with SFU - Waterproofing Feedline and Control Cables

News reports in May 2021 highlighted the development of a new waterproofing material by chemistry Professor Hogan Yu and his laboratory colleagues at Simon Fraser University. According to reports [1],

> *"A new coating solution discovered by researchers at Simon Fraser University can transform regular materials into waterproof surfaces. The product will be cheaper to produce, free of harmful fluorinated compounds, and effective on a variety of materials."*

I read the news story and thought that this material could potentially be of great help in waterproofing antenna system feedline and control cable connections. Ingress of water into antenna systems has been a problem for amateurs since the early days of our hobby, and indeed for all sectors of the telecommunication industry, for probably a century. We have all experienced the effect of leaky connectors or shorted feedlines due to water ingress. There are lots of waterproofing solutions, but none is perfect.

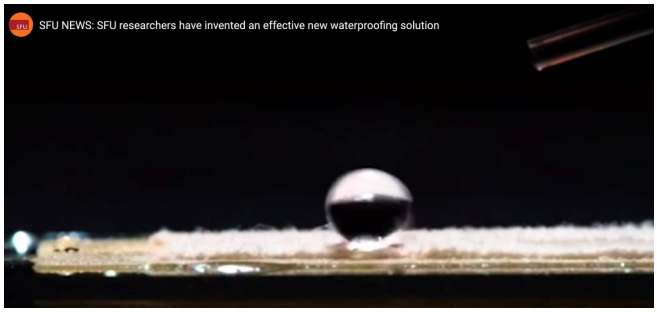


Figure 1 – Screenshot of Waterproofing Material from the SFU Video

The lab at SFU is moving the new material into the product development phase and they are looking for field testers who will help them evaluate the real-world performance of the

material and give them feedback which will help develop a practical waterproofing product.

I thought that this could be an interesting and fun opportunity for SARC. I got in touch with Professor Yu, explained what amateur radio is about, described the role of SARC in the community and our collaboration with other emergency services, and explained how SARC is a key component of Surrey's emergency response planning. If we could test the lab's material and help Dr. Yu and his team develop an effective product based on their discovery - maybe one designed specifically for use in outdoor telecom equipment, then that would be great: not only for us (because we would have more robust communication systems), but for society as a whole.

Professor Yu was enthusiastic about this idea and put me in touch with some of the lead researchers on his team. I provided some documentation and photographs of typical feedline and control cable connections to the researchers. I spoke to our directors and our president John VA7XB about the potential project and got their agreement to explore the idea further.

As a result, SFU has applied for funding from the National Science and Engineering Research Council (NSERC), proposing a collaboration with SARC for field testing of their new material this coming fall and winter. We wrote a letter to NSERC as well in support of the field testing and will likely hear back from them in the coming weeks.

As a large and progressive amateur radio group with a significant number of members who have experience in science, technology, and engineering, I think that we can contribute a lot to the testing process. If the NSERC application is successful for SFU then we will be looking for volunteers to get involved in testing the new waterproofing material. More information will be forthcoming from VA7XB and your directors as it becomes available.

First Experiments with 2m EME

I'm now equipped with a minimal station for digital 2m EME and have been running some experiments in reception of JT65 and Q65 signals using the WSJT-X package for the past month.

My station consists of a 12-element Yagi antenna (see Figure 2), a preamplifier mounted at the antenna, a short length of low-loss LMR400 feedline, a transverter that will convert 144 MHz signals to the 28 MHz band, and an Elecraft KX3. I am tracking the moon using my own software and a pair of azimuth and elevation rotators and a rotator interface, as described below.

Figure 2 – Mast-mounted 12-element Yagi

I have a 350-watt 2m linear amplifier for the transmit side, but I want to be able to receive JT65 or Q65 signals reflected from the moon first. There is no point transmitting before one can receive. Like Hiram Percy Maxim W1AW used to say, "you can't work 'em if you can't hear 'em".

I can report that my experience so far has been disappointing. I have not yet received a single successful decode via EME from another station.

The point of writing about failure is to point out the extreme challenges involved in putting together a working EME station. The path loss of a 2m EME signal is about 250 decibels. This is another way of saying that only one part in 10^{25}, or 0.00000000000000000000001 percent of your transmitted signal makes it back to earth. Receiving such signals is very challenging and to achieve success your antenna and receiver losses must be minimized.

So, some analysis of where my setup could be falling short:

a) I am concerned that my Yagi might not be working effectively. I built the antenna at home (in fact, it was the subject of an earlier column in 2019) and although I followed the specifications to the letter, there could have been some errors in the way that I put all the parts together. The antenna works well for terrestrial communication on 2m (for example, in meteor scatter and FT8 contacts out to several hundred kilometers), but it might not be up to snuff for the weak signal challenges of EME.

b) The theoretical gain on my homebrew Yagi is about 14.5 dBi. A single antenna might simply not have enough gain to be able to recover weak EME signals. I had used a similar homemade single antenna, however, for 2m EME with modest success in the early 1990s, so I thought that this new homebrew antenna would probably work.

c) My feedline, at about 40 feet, might be too long and have excessive loss that is rendering the very weak EME signals inaudible. I could change to lower loss feedline or even Heliax.

d) My moon tracking software could be pointing the antenna incorrectly. Visually, my antenna tracks the moon very closely when you look down the boom of the antenna (like in Figure 3), but the antenna radiation pattern might be misaligned with the visual axis of the boom. I have tried pointing the antenna off of the moon by a few degrees in all directions to check for this, but it does not seem to make a difference to my (non) reception of EME signals.

Figure 3 – Accurate Moon Tracking [2]

e) RF noise in the urban environment could be masking the very weak EME signals. This could be addressed by a better antenna with reduced off-axis sidelobes.

f) Lastly, there could be other issues in the "receive chain" through the preamp, feedline, transverter or in my KX3 radio. However, I have checked the accuracy of the radio frequency, the noise level and signal sensitivity and have found them all to be nominal and in-spec using calibrated test equipment.

This lack of success has been very disappointing, but I am not going to give up! My current plan is to look at replacing the single homebrew Yagi with two EME-proven high quality Yagis from a well-regarded antenna firm in the UK. This and other small changes will raise the antenna system gain to around 18 dBi (a gain of 4 dB over the current setup, or signals being about 2.5 times as loud), and with other potential changes such as shortening feedline length or going with

lower loss coaxial cable will likely enable successful reception and decoding of Q65 or JT65 signals.

Tracking the Sun and Moon with a Raspberry Pi

I have always liked astronomy and been interested in the motion of the sun, moon, and planets. A couple of years ago I was in Portland, OR and found a copy of an interesting book on the mathematics behind astronomical motion [3]. See Figure 4. The author explains coordinate systems, astrometric models, and all you need to know to track the sun, moon, planets, or even the Milky Way galaxy in about 180 pages. A very interesting book!

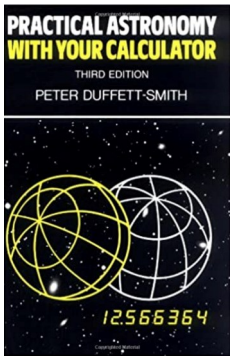


Figure 4 – Astronomical Formulae

I needed to track the moon for my new EME station and thought that this would be a great opportunity to apply these formulae and develop my own software for this purpose. While I could have downloaded one of the several popular moon tracking programs, I thought that I would learn more by solving the problem myself.

My software (which is available through my GitHub site,

See: https://github.com/mcquiggi/Tracker) runs on the ubiquitous "Raspberry Pi" device and interfaces to azimuth and elevation rotators through the popular "Hamlib" rig and rotator control package [4].

The program is written in C and needs no additional packages. The user interface is straightforward and has options for setting your grid square, rate of update, and selecting either the sun or the moon for tracking. There's no need to know your latitude and longitude; the program calculates this from your grid square. See Figure 5. Once running, the program interfaces to your rotators and keeps them pointed at the target.

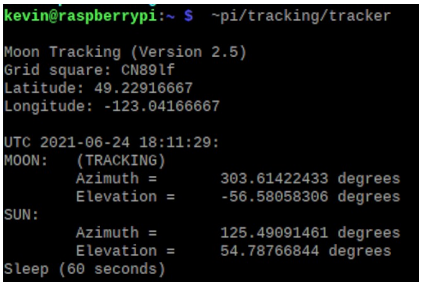


Figure 5 – Moon/Sun Tracking Program

Sun and moon tracking uses very similar math. It turns out (see the explanation in the book by Duffett-Smith) that solving the tracking problem for the moon also solves it (well, probably to 90 percent) for the sun, so I added sun tracking to the program as a secondary option.

Sun tracking can be helpful for testing VHF/UHF antenna systems because it allows you to easily check your antenna mount's alignment (see Figure 6 below), and to evaluate your antenna system's performance by checking for maximizing "sun noise" [5]. Errors in your mount's alignment can be easily corrected by minimizing the antenna's shadow on a sunny day.

Figure 6 – Accurate Sun Pointing Minimizes Antenna Shadow!

I am using the highly regarded "ERC" rotator interface by DF9GR [6] to control the position of my azimuth and elevation rotators. The interface runs on 12 VDC and uses either a USB port, a serial port, or your LAN to communicate with its controlling device. See Figure 7.

Figure 7 – ERC Interface Box

"Tracker" version 25 is open source and available for download and use under the GNU General Public License. Feel free to download it from GitHub.

Wooden Dowel as a Crossboom – Not Recommended!

Here's another story of failure. When I deployed the homebrew 2m Yagi on the short tilt-up mast in our backyard, I needed a non-conductive crossboom to mount it on. Metal crossbooms can interfere with the antenna's pattern and degrade both gain and noise rejection figures for directional antennas.

I have used black plastic PVC pipe crossbooms in the past, but for this new installation the common sizes of PVC (and ABS) pipe were either too small to have the required rigidity to support the long-boom Yagi, or they were too big to fit through my elevation rotator. I settled on using a 4-foot long 1.5-inch diameter piece of wooden dowel as purely an interim measure. See Figure 8.

Figure 8 – Wooden Dowel Crossboom

This worked well for a few weeks, but I noted that with the combination of rainy and then warmer weather that the clamp holding the antenna to the crossboom kept coming loose. Presumably this was due to the wood absorbing moisture from the rain and expanding, and then shrinking as the wood dried out in sunnier weather. It would have been much better to have treated the dowel with several coats of marine varnish or other water-resistant material.

With all this expansion and contraction and expansion the boom to mast clamp would not stay tight. I had to get out the ladder and tighten the four bolts of the antenna's boom-to-mast clamp several times.

Last week things reached a critical point. The antenna elevation had slipped again overnight and was off by about ten degrees following a day of rain. I put up the ladder, loosened the bolts and was pulling on the antenna to get it back in alignment when a large "crack" sound drew my attention to a 20 cm split in the wooden dowel, right next to where it emerged from the elevation rotator. The antenna sagged and I grabbed it instinctively to prevent the dowel from breaking completely, and the antenna from falling to the ground.

Fortunately, my XYL Laura (VE7LPM) was outside as well washing her car, so I was able to shout for help. An experienced antenna-wrangler, Laura grabbed the lower end of the

Yagi while I held onto the broken dowel, and together we held it and prevented it from becoming a tangled mess of aluminum on the ground. The next problem was the feedline: it was still strapped to the antenna mast, and I would have to cut cable ties (or at worst, feedline) to be able to get the Yagi onto the ground in one piece. I had side-cutters with me, so with a bit of a stretch atop the ladder I was able to cut the cable ties, and we lowered the antenna gently onto the ground.

Without any other non-conductive material available, I decided to accept the negative effect on the antenna pattern, and in a couple of hours had the Yagi back up on a much stronger crossboom using some surplus metal tubing that I had under the back step. See Figure 9 for the current, revised installation.

Figure 9 – Wooden Crossboom Replaced

I have some feelers out for suitable non-conductive fibreglass booms and will replace the metal crossboom with that non-conductive material when I have some on hand. In the meantime, I will live with any signal degradation that may be taking place.

The moral of this story is that it is not a good idea to support even a light VHF or UHF antenna using untreated wooden doweling.

I had deployed the doweling on a temporary basis but should have replaced it with a more robust material within a few days at most. Fortunately, the doweling did not break when no one was around – this would have significantly damaged the antenna and could also have presented a danger to people on the ground, even though the mast is only 8 feet tall.

An Excellent 23cm Linear Amplifier

For my last topic of the publication season, I would like to briefly review an excellent 23cm (1296 MHz) linear amplifier that I purchased from a company called "VHFDesign" in Ukraine (see https://vhfdesign.com). The VHFDesign folks, who call themselves the "Amateur Radio Development Team", are all hams and specialize in the design and manufacture of amateur gear for use at 50 MHz and above.

Over the past couple of years, I have bought low noise amplifiers (preamps) from them for 6m and 2m, plus a couple of "sequencers" that control the TX/RX switching of station components in and out of circuit, typically at VHF frequencies and above. These devices worked well, were of quality construction, and were competitively priced.

I was interested in getting on 1296 MHz for EME experimentation and noted that the company has a well-regarded 300-watt solid state power amplifier in their lineup. The unit uses LDMOS transistor technology that is far more efficient than older tube-based amplifiers. The amplifier weighs about 6 kg and runs on 28 VDC, supplied by an internal power supply. Line power into the amplifier is 120 or 220 VAC. See Figure 10.

Figure 10 – 300-Watt 23cm Power Amplifier

The amplifier has automatic protection circuits for high SWR, shorted feedline, open feedline, and excessive internal temperature. After consultation with some friends in the VHF/UHF community who have experience with these units, I thought that I would give their amplifier a try.

I placed my order in January of 2021. This generated an email conversation with VHFDesign staff, as the company is small enough that each device is "made to order" in consultation with the customer. Although English is not the group's primary language, we were able to come to agreement as to specifications of the amplifier, and my unit's assembly started.

I should add at this point that, given the horror stories all too common in North America about cybercrime originating in the former eastern bloc, I did think twice about sending upwards of $1000 to Ukraine via the Internet. Considering the fact that I had bought from VHFDesign twice before, their good reputation in North America, and my detailed technical communication with staff, however, I knew that it would be a safe transaction.

I paid via PayPal and was advised when the amplifier was finished. It shipped via Russia Post in early February. This was to be the start of a bit of a delivery saga, which I will describe in some detail as it exemplifies the good nature of amateur radio and most ham radio operators.

VHFDesign is located near Donetsk in eastern Ukraine. Eastern Ukraine uses Russia Post due to the complex political situation in their region. I learned later that the big courier companies such as FedEx and UPS have shipping restrictions that will not allow electronics and radio equipment to be shipped from this region. Russia Post is currently the best shipping option to North America.

My amplifier entered the Russian postal system on February 4th. I received an email with the tracking number from VHFDesign. I observed its movement on https://www.pochta.ru as the package transitioned through the various stages of customs in Moscow until it was "Released from Russia" on February 18th.

Then it seemed as if the amplifier had vanished into a black hole.

Tracking the package through Canada Post was also possible, but for several weeks https://canadapost.ca only stated "Waiting for item". I began to get concerned.

A quick email exchange with the very helpful Oksana at VHFDesign initiated a package search by Russia Post, while I made similar inquiries with Canada Post from my end.

About eight weeks went by. No change in status and further email discussion with Oksana led us to the agreed-upon conclusion that the amplifier must have been lost. She issued a full refund, and the money was deposited into my PayPal account within the hour.

I was truly impressed with VHFDesign's ethical standards and their strong customer service – many other companies would have balked at a refund and directed me instead to take the problem up with two postal services involved. I am certain that that would have been a challenging experience.

I thanked Oksana and her group profusely, and we decided that should the amplifier ever show up that I could either send it back, or accept delivery and pay VHFDesign for it again. They put a level of trust in me, the customer, that a lot of other companies would not have. I was impressed with the company once again.

Fast forward seven more weeks. On a Tuesday morning in early June, I got a "high priority" email from VHFDesign. Oksana had been notified that, through some miracle of black hole physics, my amplifier had been found. It was, in fact, in Canada and was due to be delivered on Thursday.

I was flabbergasted – I had been certain that the amplifier had been lost at sea, gotten damaged falling off a truck, or had indeed vanished into another dimension never to be seen again! An online chat session with a helpful Canada Post lady confirmed that the package had indeed arrived in Canada, cleared customs in Montreal, and been expedited to Vancouver for delivery [7].

The amplifier arrived, in fact, the very next day. It was undamaged and all the paperwork was complete, although nothing could explain where it had been, nor why it had taken so long to arrive. I was ecstatic! See Figure 11.

Figure 11 – Miracle Package Arrived

I opened the package, inspected the amplifier, accessories and documentation, switched it to 120 VAC from the default 220 VAC, and plugged it in for a power-up test. See Figure 12. All looked good, so I started to gather the dummy load, feedline, PTT cable et cetera to give it an initial test with RF. I also downloaded the 37-page manual for the amplifier control unit and reviewed it thoroughly to ensure that I understood its operation and all the interconnections.

Figure 12 – New 23cm Amplifier in Perfect Condition

The amplifier is rated for 300 watts output from 2 watts input. 300 watts at 1296 MHz is "serious power" that can damage both equipment and us humans if things are not hooked up properly. Cables and connectors must be of appropriate rating and well-constructed. Safety first!

The test plan for the new amplifier had it fed by my Icom IC-9700. The amplifier output went into a Bird wattmeter with a 500-watt element, and from the wattmeter into a 500-watt oil-filled Bird dummy load. Feedline from the amplifier was LMR600 to ensure safety. Smaller cables such as RG8X or even RG213 are at risk of melting or shorting above 2m at higher power levels so they must not be used at 23cm. I preconfigured the rig for maximum 2 watts output power to ensure that the amplifier would not be overdriven.

I set the rig to 0 watts output. Cables were tight and correct, the wattmeter was in line, and the dummy load was all set. A PTT test keyed the amplifier, so it was on to RF testing.

0.1 watts input produced 19 watts output. 0.2 watts produced approximately 40 watts. I increased the input power to 1 watt in 0.1 watt increments and noted that output power rose to 297 watts. 1.2 watts produced about 350 watts output at 1296 MHz, slightly above specification for the amplifier. I would stop the test here [8]. I noted that the LCD display on the amplifier performed well, indicating power output, current, SWR and internal temperature. I did not proceed to the rated 2 watts input in order not to overstress the LDMOS transistors. See [8].

Finally, I must add that I happily repaid VHFDesign (I "refunded their refund") for the cost of the amplifier and shipping [9]. It is a fantastic unit, and I am sure that I will have lots of fun with it. I am specifically looking forward to using the amplifier in my planned 23cm EME station: more on that in a future column.

Summary

That's it for this issue, and for the 2020-2021 publication season. Everyone have a great summer: enjoy the fine weather, and all the best for DX, or casual operating, or whatever you most enjoy in this fun hobby of ours. Thanks for reading my reports throughout the year and for your positive comments.

Feedback on this article can be directed to the Editor, or directly to me at mcquiggi@sfu.ca.

~ Kevin VE7ZD / KN7Q

References:

[1] https://phys.org/news/2021-04-waterproofing-solution.html

[2] Thanks to my friend Dennis Rosenauer AC7FT/ VE7BPE for this photo.

[3] "Practical Astronomy With Your Calculator" third edition, by Peter Duffett-Smith (ISBN 978-0521356299) is available on Amazon.

[4] Hamlib is used by several popular radio and rig control applications and is available at https://hamlib.github.io/.

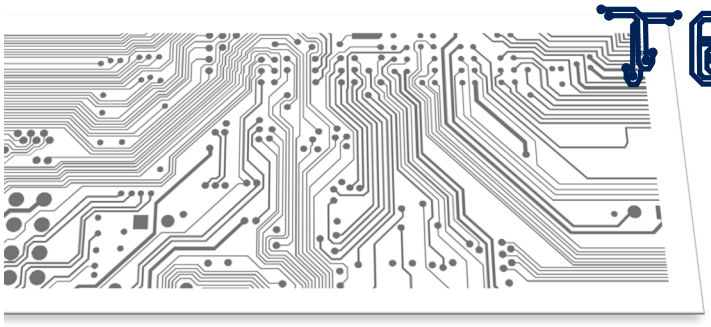
[5] The sun emits broadband radiation that can be used at VHF and above to check the directivity and effectiveness of your antenna system. Pointing the antenna at the sun should maximize noise in the receiver. Noise should reduce when you then move the antenna away from the sun.

[6] The Easy Rotor Control ("ERC") is available via https://www.schmidt-alba.de/eshop/index.php?cPath=1.

[7] My opinion is that the amplifier must have been delayed in Moscow, shipped by sea, or perhaps arrived in Montreal and been subject to a mountainous COVID-related backlog of parcels. I will never know for sure!

[8] Power amplifiers will typically indicate both rated input and rated output power. It is important to stop when EITHER rated input power is reached, OR rated output power is reached! To exceed either rating will likely damage or even "break" the amplifier. In this case, I reached rated output power with only 1.2 watts input, so it was time to stop. Increasing input power to the rated 2 watts would likely generate output power much greater than the rated 300-320 watts, but the LDMOS transistors would be overstressed and would probably have failed. LDMOS transistors are expensive. Don't break your amplifier by exceeding its ratings!

[9] I also suggested that VHFDesign look at alternatives to postal delivery. Courier service is currently impractical due to the political situation in eastern Ukraine, but Oksana did tell me that the only countries which may experience protracted delivery delays via post are Canada and Australia. Postal shipments to all other nations are routinely on the order of 10 to 30 days.



TECH TOPICS

Mike Weir VE9KK

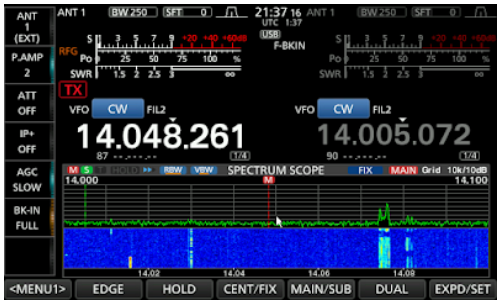
Further investigation of my ongoing RFI

In a previous post regarding my RFI issues I kinda narrowed it down to my smart hydrometer. I am now starting to move away from that theory. The RFI is still there and I have been doing some reading regarding our smart meter and the frequency they use to transmit data does not jibe with an HF harmonic and I have been logging the RFI and there are some on/off times for the RFI and when I visit the meter during off times the noise my AM radio picks up is still there and just as strong. I have therefore removed the smart meter as an issue.

About a month ago I received an email from a fellow ham who was dealing with some RFI and it seemed to be on a 12 hour on/off cycle. This got me thinking of a timer operated device, the ham had contacted hydro and they came by but really found no issues well none that seemed to connect to a 12 hour on/off cycle. I got to thinking and asked him to check with neighbours if they recently purchased a grow lamp system. A short time later he emailed me informing me that his neighbour in fact did purchase a grow lamp device. When the device was unplugged his RFI issue went away. He is now filtering up the grow system to remove his RFI issue.

RFI filled day

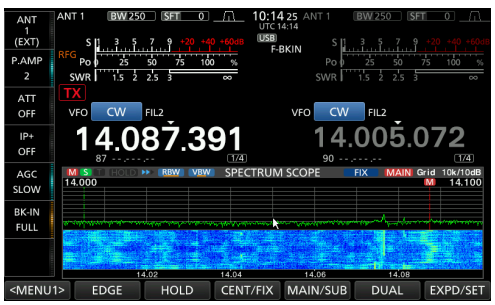
Now back to my RFI issue, I have started to log the on/off times for my RFI and it for sure is not on a precise 12 hour on/off cycle BUT it seems to turn off at night. Many times between 23:00 to 23:30. Other times I have seen it off at 21:00 but I can say that it is off each night and the off time my vary. As for the on time it can vary from 07:30 to 10:00. I have also had occasion were it has been off most of the day as well. My understanding is that the device is being turned off/on by the owner and not a timer. Because most of the time the on time is about 12 hours I am thinking it too is a grown lamp.



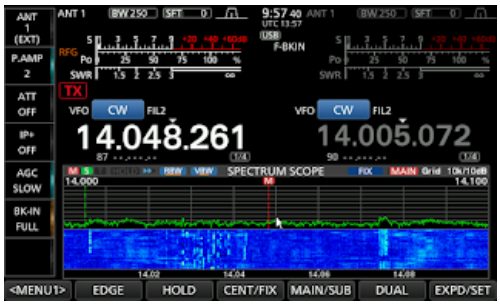
A nice, RFI free evening

I have asked the folks on both sides of me and have been told that neither have a grow system. I do understand they may not be telling me the truth as it really is none of my business. One of my neighbours I have been in his home and I can say that I have not seen a grow

RFI filled day



system anywhere. I have even wondered close to their homes when I have the RFI and I pick up nothing.



Sometimes the RFI is not to bad

I do have an MFJ 1026 noise cancelling unit and for this device to work you need to have a listening antenna that hears the same RFI as the main antenna. I have been playing around with noise antennas for a few weeks and my result will be in my next post… I was very surprised and confused with the results.

~ Mike VE9KK

Mike Weir, VE9KK, writes from New Brunswick, Canada. He has a blog at http://ve3wdm.blogspot.com and you can contact him at ve9kk@hotmail.com.

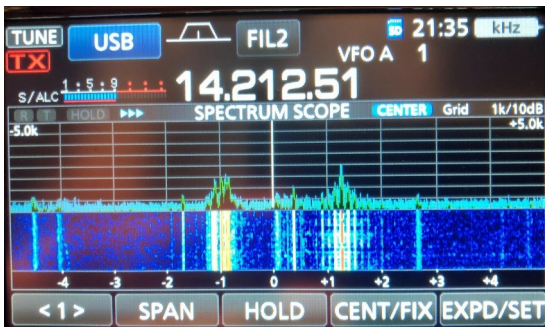
Editor's comment: An RX80M foxhunt receiver is a perfect device for hunting RFI on the HF bands. Sensitive and directional. *See page 85.*

Have birdies moved in? It may be your USB cable

For months I have been troubled by birdies on my iCom 7300. In RF language, birdies refer to spurious signals or "spurs" as some would call them. These could be caused by unfiltered/poorly filtered mixing products or unfiltered/inadequately screened high order harmonics of signals or a combination of both.

It was annoying, particularly on 20m, as shown in the screenshot. They occurred at regular intervals on the band, completely eliminating any opportunity for contacts where they occurred.

I initially suspected a noisy walwart or LED fixture. Methodically unplugging each did not resolve the problem. Next I took an old AM transistor radio set on an empty frequency near the bottom of the band. This method has worked well for me in the past and we demonstrate this method in our Basic Amateur Radio course



[https://youtu.be/p8i8HmxeHnM]. Unfortunately it did not reveal the reason for the interference.

By accident I happened upon a site that suggested the USB control cable from the radio to computer could be the culprit. Many USB cables are not well shielded. Upgrading to a better cable with ferrites at each end solved my problem, the birdies have flown.

~ John VE7TI

Click on the photo below for a link to my new cable from Amazon.ca

Hamshack. ca

Don Rosberg VE7DXE

New Amateur club listings

I'm pleased to provide an update on hamshack.ca which was mentioned in the January 2021 edition of the Communicator. Hamshack.ca was a project developed to address the cancellation of in-person Amateur Radio "buy and sell" events as a result of the ongoing Covid19 pandemic. My goal in developing hamshack.ca was to provide an easy-to-use, free "buy and sell" site dedicated to amateur radio operators across Canada.

The site was designed to current web development standards and includes an intuitive user interface which makes it easy for users to add their listings. Hamshack utilizes powerful filtering and search tools making it easy for users to quickly locate items listed on the site. Potential buyers can filter listings by category and location to dynamically display items matching the criteria entered. These features have helped to make hamshack.ca extremely popular. Activity on the site has increased steadily since its launch in November 2020: hamshack.ca now averages about 12,000 views per week, with over 500 registered users.

Hamshack has become more than a ham radio "buy and sell" site, and now also includes a Repository of Canadian amateur radio clubs. This Club Listing section provides an opportunity for Amateur Radio clubs and organizations to list their events and activities, club meetings, repeater, and contact information. Each club's hamshack profile is linked to the club's website eliminating the need to maintain information in multiple locations and ensures the information is always current.

Many clubs have also opted to display hamshack "buy and sell" items listed for their specific location directly on their Club Listing page; this service eliminates the need for an organization to operate a dedicated ham radio buy and sell page on their website. For example, the Halifax and Moncton Amateur Radio Clubs have added "Buy and Sell" links on their websites, which direct users to their hamshack pages, with all available listings for Atlantic Canada. This is a free service intended to help clubs reduce the cost and effort of maintaining their own website.

As we've been working our way through the pandemic, I've been thinking of ways to leverage the popularity of hamshack.ca to help promote the many services provided by amateur radio groups across Canada. Indeed, many clubs are active in the community providing a wide-range of services, including Emergency Communications support; many organizations have partnered with amateur radio groups to help provide communications and logistical support during emergencies.

The Club Listing Template was recently updated to include a section for club representatives to add information about their Emergency Communications capabilities, which helps to support these partnerships. It's my hope that the consolidated emergency communications information on the website will be accessed by public and other entities for emergency planning purposes, and will also help showcase the public service activities of participating clubs.

Hamshack was originally launched as a temporary "buy and sell" website during the pandemic. However, the popularity of the site, and the addition of the new features, suggest that hamshack is here to stay. It is anticipated that:

- Activity on the site will continue to increase;
- Club Listing Emergency Communications information will be a useful resource for organizations adding amateur radio emergency communications to existing emergency plans; and
- Clubs will save time and money by using hamshack.ca as their buy and sell platform.

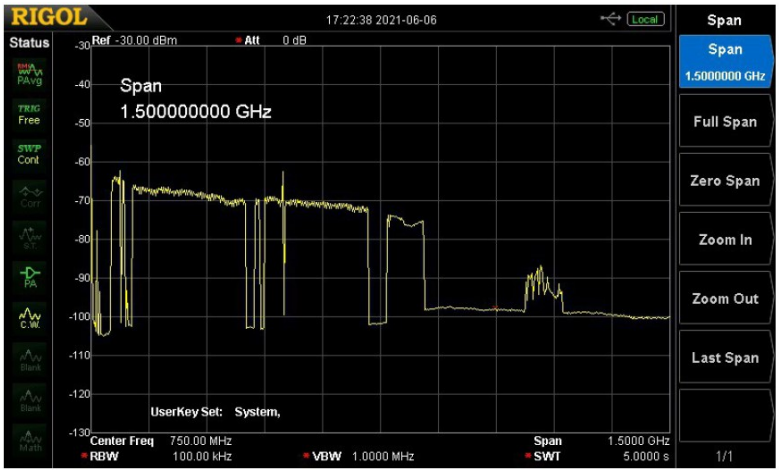
Watch for Hamshack.ca Version 2.0, which will include additional one-of-a-kind features and content suggested by users, making the site Canada's one-stop Amateur Radio website.

~ Don VE7DXE

...more TECH TOPICS

Jim Andrews KH6HTV

What is in the Cable TV Spectrum?



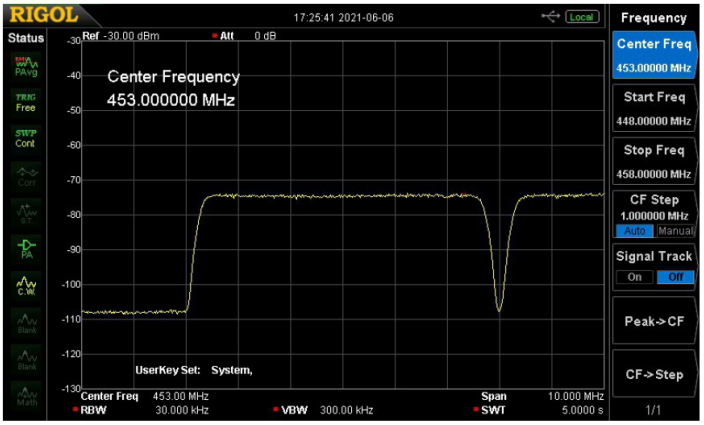
I recently received an inquiry from Bil, K1ATV, in Mesa, Arizona about cable TV. He has Cox Cable in the Phoenix area. He wanted to know what system they use? Could it be DVB-T? Can it be decoded with our ham DTV gear?, rf channels, etc.? For specifics on the Phoenix, Cox Cable, I referred Bil to the other Arizona ATV hams.

Because Bil asked these questions, I decided it would be informative to other ATV hams to discuss digital CATV. To illustrate a typical system, I connected my own cable TV signal to my Rigol spectrum analyzer to provide some visuals. Here in Boulder, Colorado, we receive our cable service from Comcast. The photo *[top left]* is a full sweep of the Comcast cable from 0 to 1.5 GHz.

The "Bible" for all technical questions relating to digital TV is a book I found by Walter Fischer, an engineer with Rhode & Schwartz in Germany. The book is entitled "Digital Video and Audio Broadcasting Technology". It is published by Springer and is available in both German and English. For any DATV ham who really wants to know the real guts of DTV, I highly recommend this book. It covers DVB-S, DVB-T, DVB-C, ATSC/8VSB, plus several other systems.

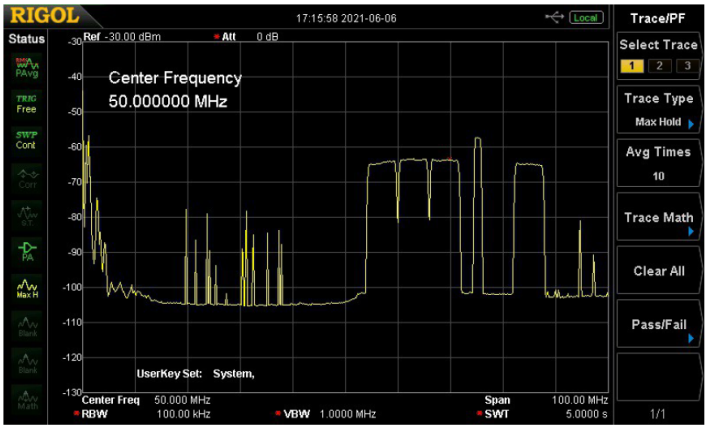
Here in the USA, the cable companies use a form of DVB-C, called ITU-T J83B. The international standard is called J83A. For the USA, J83B, the RF channel bandwidth used is 6 MHz. The modulation methods used are either 64-QAM or 256-QAM. J83B uses a different, complex, scheme of error protection (FEC), than J83A. For 64-QAM, the gross data rate is 30.34 Mbit/s. For 256-QAM, the gross data rate is 42.88 Mbits/s. The spectrum is carefully controlled with smooth roll-off filters on the channel edges.

So, lets now look more carefully at what we see in the CATV spectrum. *[top right]*



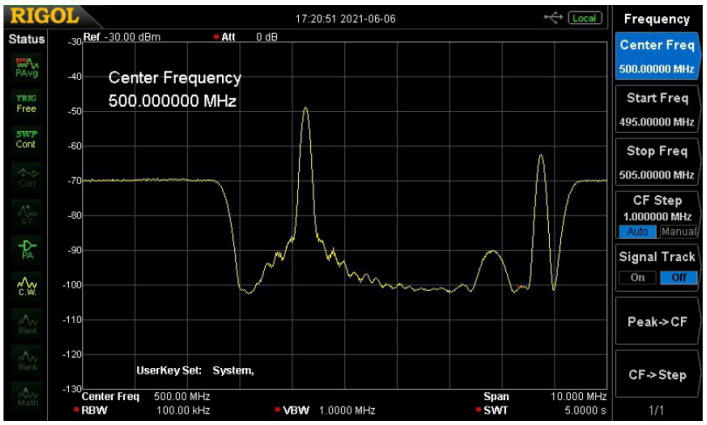
This shows the typical spectrum of a single TV channel. It is cable channel 62 (453MHz). 10dB/div & 1MHz/div. Resolution band-width was set to 30kHz. Note: there was no signal on Ch 61, but there is another signal present on Ch 63. Note the deep notch at the channel edge. The channel filter roll-off is thus preventing cross-talk into the adjacent channels. The noise floor of the measurement was about -109dBm.

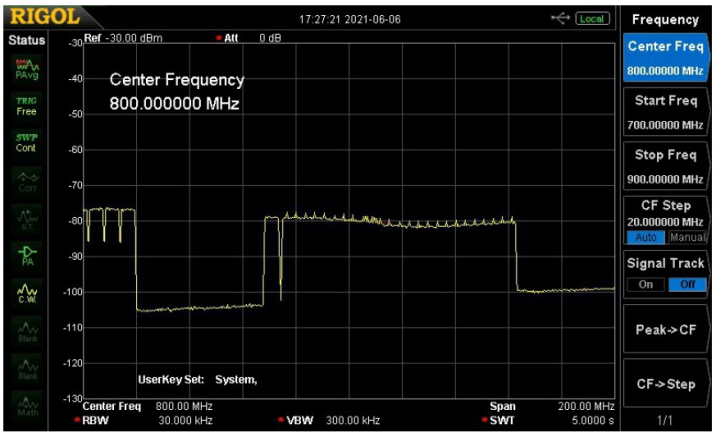
The photo *[centre right*] is what we find at the bottom end of the band. The frequency sweep is from 0 to 100 MHz. The key thing we find here is the "Up-Stream" data flow. This is where we the users send our data out to the internet. The region between 5 and 42 MHz is used for this purpose. While watching this on my spectrum analyzer, the spikes seen occurred randomly. The cable company uses bi-directional amplifiers to accommodate the up-stream vs. the down-stream data flows. The cross-over region around 50MHz is thus empty. Above 50 MHz, we now see appearing starting at 54MHz, Ch 2, 3 & 4. There next appears a narrower (1.3MHz) digital signal. I don't know what it is used for ?. It then appears that the cable company leaves the FM broadcast band (88-108MHz) empty for fear of RFI. I did find local RFI there from two nearby, strong FM broadcast stations. In years past, the cable companies included a single carrier at about 110MHz which was used by service trucks to locate leaks from the cable system. I did not find that, nor any other similar signal to be present anymore.

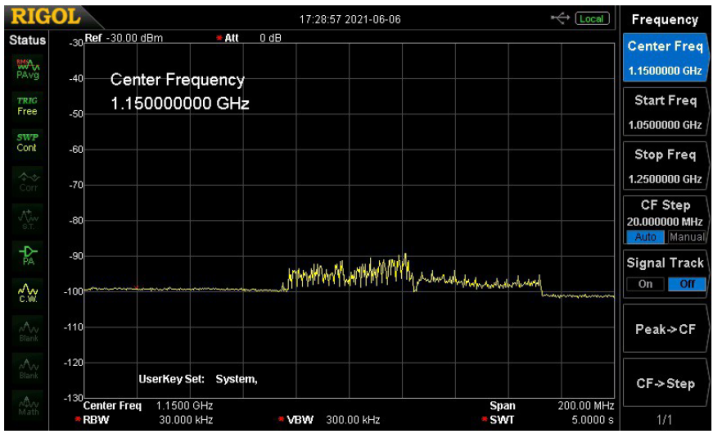


The region from 110 to 400MHz was totally filled with 6MHz, DTV channels. Then again from 450 to 720MHz was again filled up with more DTV channels. With one exception.

The exception was at 500MHz, *[photo lower right]* where I found a single analog TV signal on channel 70. Here we see the video carrier at 499.25MHz. Also visible is the 3.58MHz color sub- carrier and the 4.5MHz sound sub-carrier. When I connected an analog TV receiver to the cable and tuned it to Ch 70 I found this to be just a black screen with no audio.







The photo *[left]* is the region above 720MHz. Here we find one single DTV channel, but then a spectrum totally different from DVB-C. This appears to be a very wide, about 90MHz band-width digital signal with a bunch of pilot tones. This is for internet use. It is the "Down-Link" of data from the internet, plus whatever signaling the cable company needs to use.

At the lower left is the last region found on our sweep up to 1.5GHz. It is a new concept for me. When the Comcast service tech installed our service when we moved in, he explained that they now install a "master" set-top receiver in the living room. Then for all other TV sets in the house, they install "slave" set-top boxes. The slave in our bedroom is actually a much smaller unit than the master. The tech explained that the master and slave talk to each other on a frequency above 1 GHz. Thus, the signal seen here between 1125 and 1220MHz must be for the master/slave communication. It is seen to be two distinct signals of about 50MHz width.

So, back to K1ATV's questions. He asked "Can we use our ham DTV gear, such as the Hi-Des receivers to watch cable TV?"

NO, Bil, sorry - We are using DVB-T (or some hams DVB-S). Not DVB-C, J83B. Plus, Comcast, and probably most other cable companies today encrypt (scramble) their transmissions. While the TV receivers we buy at Wal-Mart, etc. come equipped with a digital cable tuner for both broadcast ATSC and cable J83B, they still will not work. I tried doing an auto-scan on my Comcast cable with two different brand receivers and neither one would receive nor decode any of the Comcast channels. Thus they were all encrypted.

I might add a note. The modulators and receivers from Hi-Des do come equipped with the capability of encrypting and unscrambling their DVB-T transmission. However, we as FCC licensed radio amateurs are strictly forbidden by FCC rules from encrypting our transmissions. Thus we should never use this feature.

Another note: Back in 2010, I an several other Boulder hams experimented using digital cable TV, J83B, for over the air amateur transmissions. We found it quite unsatisfactory. While it sometimes worked, it often did not, even for line-of-sight paths. The issue was multi-path. With much multi-path present, the CATV digital receiver simply could not decode the signal. So by 2014, when we discovered DVB-T and Hi-Des, we abandoned digital cable, J83B, for DVB-T. We are very happy we did so. DVB-T tolerates severe multi-path and we have had great success with it.

~ Jim, KH6HTV

This article courtesy of the Boulder Amateur Television Club TV Repeater's REPEATER newsletter—June, 2021

BATVC web site:
www.kh6htv.com
ATN web site:
www.atn-tv.com

kh6htv@arrl.net

...more

TECH TOPICS

Fred Orsetti VE7IO

Remote operation of the VE7IO Icom transceivers

History

I have operated a multi-multi contest station for a few years with many guest operators participating from my shack. The shack is equipped with two IC-7610 transceivers, two legal limit amplifiers, dedicated computers and remote antenna switching.

Antennas consist of a south tower at 56 ft. with a 3 element SteppIR and a north tower at 64 ft. with a TH6 tri-band. Wire antennas for 80 SSB and a 250 ft. off center fed dipole for 160, 80 CW, 40 meters and other bands as well if needed. During some contests we have moved the SARC "big foot" tower and TH7 onto my property so we could operate 3 radios. This was only for specific contests.

My wife has advanced Parkinson's disease and over the past two years I have had to provide increasing amounts of caregiving. Having to spend more time upstairs with my wife I was finding it very difficult to operate the radios which were in the basement. A close friend suggested that I remote the radio so I could operate and be upstairs at the same time. I decided to take his advice an acquired the Icom RS-BA1 remote software.

The two Icom IC-7610s and amplifiers at VE7IO's station outside Vancouver

At that point I had no idea what I was doing so I reached out to the technicians at Icom who were very helpful in getting my basic remote setup working.

Getting started

The basic setup consists of the Icom RS-BA1 remote software running on a laptop and one Icom IC-7610. The software allows for two different methods of configuration. The IC7610 can be connected directly to the LAN or it can be connected using the USB port to a computer. My choice was to connect radio directly to the LAN. So the basic setup was a remote laptop running the RS-BA1 software connected to the radio via the LAN. Following the Icom setup software which can be found at RS-BA1 | Instruction Manual / Guides | Support | Icom Inc. (icomjapan.com) and making the changes to the radio settings I got it working. I could operate the radio in all modes but it was not user friendly. I quickly realized that I needed the RC-28 encoder *[photo top left]* which provided a push to talk button and a knob for changing frequencies. This is a must in my opinion for a remote setup. More on this later.

So now I was able to operate the radio but I did not have remote access to the USB ports on the IC-7610 stopping me from using N1MM, adding rotator control or using my Winkeyer for CW. I began the search for a way to access the radio's USB ports.

Solving the USB port access

Searching the internet I found that adding a port manager may solve my problem. The hardware I selected was the UTN-2500 from SEH *[three photos center and lower left]* which allowed 3 USB ports to be connected to my LAN. You can find this at myUTN-2500 (seh-technology.com). The UTN-2500 connects to the LAN with little effort.

I now connected the radio USB port to the UTN-2500. This allowed me to access the Icom USB ports. I still had two USB ports available on the UTN-2500 so I connected my two rotator controllers to the UTN-2500 as well. I could now access the radio USB ports and rotate the two antennas. All the UTN-2500 ports were now in use for one radio. The setup was easy and now N1MM, or any other logging program such as N3FJP, could control the radio as well. Good but I could not switch antennas remotely.

Adding the antenna switch

The next addition was the remote switch Antenna Genius from Flex radio 4O3A Signature - Home

Adding the 8X2 V2 antenna switch *[photo lower left]* provided remote selection of antennas and is connected directly to the LAN. The neat thing about this is that I can switch antennas from any computer on the network. Both radios are connected and can access any antenna. This is a must for any remote or M/M operation.

I am getting there... I now had control of the radio, the USB ports, antenna rotation and antenna selection. I was back to contesting remotely using the LAN.

Now to get this to work through my modem so the station could be controlled from anywhere over the WAN.

Access via the internet

The setup of the modem may vary depending on the provider but the basics are the same. I have Telus as an internet provider so I looked up whatever information I could find on the internet plus asking friends. There are settings provided by the Icom instructions for setting up port forwarding and you need the radio IP address and the audio ports. You also need to know what your modem IP address is. This can be found by accessing the modem. With my setup I do not have static IP addresses and it is something I may do later. So, sometimes Telus decides to change my IP address and I need to go back to port forwarding and make the changes and pass them onto Christine so she can change them in her setup.

You will also need to ensure that your computer firewall is set to allow access for both Icom and the UTN manager software.

It took a few hours but eventually I managed to get the numbers right and I had access the radio, N1MM (or other logging programs), the antenna rotators from outside my home. I purposely did not provide access to antenna selection at this point`.

Adding the second radio to the remote setup

Now I decided that I wanted to be able to remotely access either of my radios remotely but I had no more USB ports available. Back to the drawing board.

I decided to experiment with a powered USB hub plugged into one of the UTN-2500 ports. Remember the UTN-2500 only has 3 USB ports so I reconfigured my setup. I plugged the USB from radio one into port 1, USB from radio two into port 3 and the USB hub into port 2 of the UTN-2500. The hope being that I could add 4 more USB ports. Checking with Windows device manager I found that in fact all ports were now available. It worked!

Present configuration

At this time I now have remote control of either IC-7610, rotor control, CW Winkeyer, N1MM plus an additional audio stream from the USB port. I also have antenna selection while on the LAN but not on the WAN. For the present operation I did not want other remote stations selecting antennas while running Multi/multi. I can add antenna selection to the WAN by simply adding port forwarding to the modem for the antenna switch as it is running on the LAN and not a USB port.

How we are using my station today

Because of Covid-19 we have not been able to run a Multi-multi from my QTH for over one year. One of the regular operators, Christine, VA7TU, lives in Vancouver in a condo and wanted to be on the air. My remote setup was pretty much ready to go but we had not completely tested the WAN configuration. Christine purchased the Icom RS-BA1 software and installed the SEH UTN-2500 software. She already had N1MM installed. Very little adjustments were needed mostly setting up N1MM and now she has full access to one of my IC-7610 radios. The performance was much better than expected as she has received compliments on her audio and absolutely no indication that she is operating a remote station.

Because of one radio being operated remotely, three or four times a week, I thought it would be more manageable if antenna selection was only done from the shack. As well, my amplifiers are old and not compatible with remote operation requiring me to manually tune the amps. Maybe if I win the lottery I will upgrade to modern amps.

VA7TU operating

Recently, Christine, VA7TU, operated in the YL SSB contest and worked 650 QSO's in 24 hours from her condo in Vancouver. She was able to fully use N1MM, a foot switch and rotate the SteppIR antenna as needed. I assisted with band changes as the amplifier had to be re-tuned.

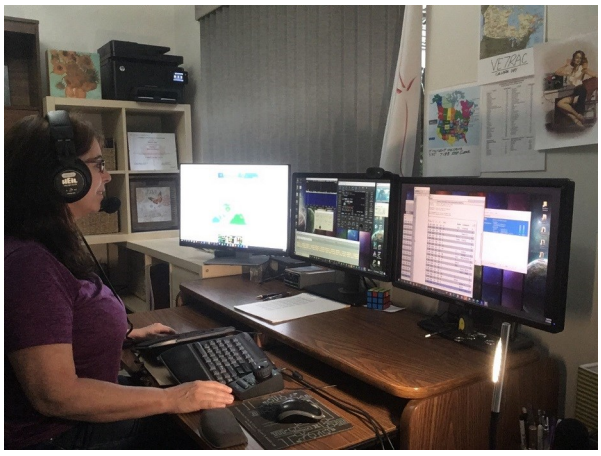
The remote side

The remote side can be a laptop or a desktop but having a hardwired connection to the LAN is important. It will work using Wi-Fi but there can be issues. I ran a laptop with a mechanical HD for a while but found that it was subject to sending poor CW and sometimes would lock up. I swapped the mechanical drive for an SSD and my problems disappeared. I still felt that the laptop was running at maximum so I went to a desktop with an i5 processor. I then installed an M.2 SSD in the desktop and now there are no issues.

The one goal that I have not been able to achieve is to use CW paddles from the remote desk. I purchased two Winkeyers trying to get them to talk to one another but no joy yet. I cannot get use to keyboard CW but I am working on it.

Fred VE7IO's remote desk

Christine VA7TU's remote desk



Christine, VA7TU, operating from her condo in Vancouver. As you can see she has full access to N1MM, antenna rotation and full access to the IC-7610.

Christine VA7TU operating VE7IO remote from Vancouver Island.

Christine, VA7TU operating VE7IO station remotely from Vancouver Island. She was using Wi-Fi and found it a bit slow. She also recommends a good internet connection.

Using distributed multi-op with remote radios

Over the past year we have used Hamachi VPN to setup a distributed multi-op (DMO) for several contests. The maximum number of stations (computers) that we can have logged in free is five. A DMO allows stations to network together over the WAN just as we would if everyone was in one shack. N1MM sets up very well and works flawlessly during a contest. We have had 5 stations logged on from various parts of the metro area. North Vancouver, Vancouver, North Surrey and South Surrey.

So with the success of our DMO operation I wondered if we could have a remote site operating one of my radios and be logged into the VPN as part of the DMO team. We had all the pieces in place so why not test it?

The master Hamachi setup is on my main computer and to have other stations join the network I send them an invitation and they install the client Hamachi software. After setting up their computer they can log onto N1MM and their station will show up on the N1MM network window.

I sent Christine, VA7TU, an invitation to join and she followed the client setup instructions. I watched the N1MM network window on my computer and there she was logged in to N1MM. It went just that easy.

What we had was her operating one IC7610 remotely over the WAN while I operated the other IC7610 using the LAN remote setup. We ran some test using both radios and logged a few dummy QSO's and it worked perfectly.

The setup would be two VPN computers at my shack operated remotely, one in North Vancouver, one in North Surrey and a 3rd radio, Flex 6700 plus computer at my QTH for a total of five.

We plan on using this setup for the upcoming Canada Day contest where we will be using VE7RAC as our call.

~ *Fred VE7IO*

2 meters

A decibel is still a decibel

Bob Witte K0NR

Bob maintains a great blog site at https://www.k0nr.com/wordpress/.

Contact Bob at bob@k0nr.com.

You can also check out his book VHF, Summits and More: Having Fun With Ham Radio.

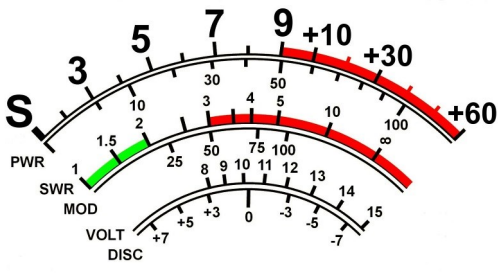
When discussing signal levels and power output, hams like to say things like:

Using higher power isn't important because it only gives you one additional S unit

and

You'll lose some power in the coax but you won't even notice a few dB

These statements are often true and at the same time may be completely wrong. I've noticed that radio amateurs pushing the limits of their station pay close attention to every decibel they gain or lose. This is especially true at VHF/UHF frequencies where signals may be weak. A dB here, a dB there, the next thing you know it adds up to something big!



Definitions

First, let's make sure we have a few definitions right. The decibel (dB) is defined as the ratio of two power levels:

dB = 10 log (P2/P1)

One decibel corresponds to a 26% increase in power level. A well-known rule of thumb is that doubling the power corresponds to a 3 dB increase. Similarly, chopping the power in half drops the signal level by 3 dB. A 10 times increase in power is 10 dB. (Voltage can also be used to calculate decibel relationships but to keep it simple, I'll just use power.)

The S Unit is normally defined as a 6-dB change in signal level, which is a factor of 4 in power. (Your S meter may or may not actually follow this rule but that is a topic for another day.)

Power Level

Let's compare a few different power levels to get a feel for how decibels and S units behave. Let's use a 5 watt QRP level as our reference power. If we crank up the power to 100 watts, we have 10 log (100/5) = 13 dB increase in power level. This is slightly more than two S units (2 x 6 dB), so we would expect the S meter on the other end to read 2 units higher.

Now suppose we kick in our linear amplifier to produce a 1 kilowatt RF signal. This power level is 10 log

(1000/5) = 23 dB higher than the 5 watt signal, or roughly four S units.

Now if our QRP signal was a solid S9 to start with, adding another 23 dB on top of it may not be that significant. The station can be heard at S9 or can be heard even louder at S9 + 23 dB. Except when there's a pile of stations all calling that rare DX… then the loudest station tends to be heard. Crafty operating skill and good luck may overcome the power difference.

But consider the other extreme. Our QRP station is being heard right at the noise floor on the receive end. The two stations are struggling to complete the contact and the propagation path degrades by 2 dB. Now the QRP station is below the noise and un-copyable. We increase our power to 100 watts and gain 2 S units… still not very strong but the ability to receive the signal improves dramatically. Crank it up to 1000 watts and you gain another couple of S units and the copy is quite good. The key point is that changes in signal level matter most at the margin, when you can just barely copy the signal. (By the way, there is nothing wrong with running QRP… many ops enjoy the challenge of making contacts with low power.)

At the receiver, our ability to recover the signal is determined by the signal-to-noise ratio (SNR). A higher noise floor at the receiver means it will be more difficult to hear the signal coming in. The type of modulation being used may also make a big difference. Good old CW and the WSJT modes use a narrower bandwidth and will get through when wider-band modulation (SSB, FM) fails. In all cases, a stronger signal works better.

Antennas

Antenna systems also increase our signal level…and they do it for both transmit and receive. I recently did some comparisons of VHF antennas from a SOTA summit. My 2m Yagi antenna has 6 dB of gain (referenced to a dipole) and my comparisons showed that the performance of this antenna was good enough to pull some signals out of the noise to be solid copy. This occurred when the other station's signal was right at the noise floor (using my lower gain antennas) such that the 6 dB improvement had a significant impact.

This book is an easy-to-understand introduction to VHF/UHF ham radio, including practical tips for getting on the air and having fun messing around with radios. Learn about FM, SSB, repeaters, equipment, band plans, phonetics, portable operating, Summits On The Air (SOTA) activations and more.

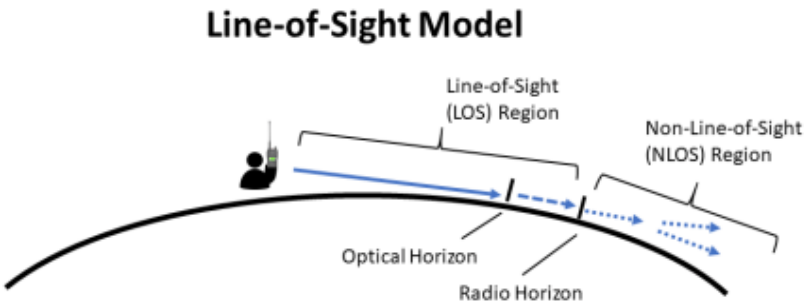
HAMpuzzle V1.2

Our new students are often confused by the block diagrams for receivers and transmitters. A freeware program to practice assembling block diagrams for the Canadian Amateur Radio Basic certification exam runs under Microsoft Windows (but also works flawlessly on Ubuntu 10.04 + Wine 1.2.2)

HAMpuzzle V1.2 (2014 04) https://www.rac.ca/wp-content/uploads/2014/04/HAMpuzzle/HAMpuzzle12.zip

Be sure to download at least one set of Diagrams from the web page and deposit the bank(s) in the same folder as the program. For Basic: https://www.rac.ca/wp-content/uploads/2014/04/HAMpuzzle/HAMpuzzle_Diag_Basic.zip

Radio Amateurs of Canada is pleased to make the HAMpuzzle© program available and extends sincere thanks and congratulations to François Daigneault, VE2AAY, for writing and providing it as freeware to anyone wishing to download it.



Sometimes hams will say that VHF is just line-of-sight propagation and that the signal level doesn't matter much. This is partially true but often we are stretching for contacts beyond line-of-sight. Take a look at this article: The Myth of VHF Line-Of-Sight. This is another case where we are operating on the margin and every dB matters.

Feedline loss can cause us to lose decibels, which impacts both transmit and receive performance. If your coaxial cable is short, then the losses may be negligible. Increasing cable length and increasing frequency produce more loss.

For example, 100 feet of RG-8X has only 1.1 dB of loss at 10 MHz. Increase the frequency to 146 MHz and the loss jumps to 4.5 dB, using the Times Microwave cable calculator. That means 50 watts of power at the transmitter turns into 17.7 watts at the other end of the cable. Using LMR-400 coax reduces the attenuation to 1.5 dB.

Summary

You can choose to ignore small changes in your signal level. A dB here or there may not make a big difference with casual ham radio operating. But these losses tend to add up and may become significant. Most importantly, just a few dB may be the critical difference between making a radio contact or not, when operating at the margin.

~ Bob K0NR

Need more reading material?

If you're looking for some additional reading, we have a solution for you. All of our past issues of **The Communicator** are available via our blog site. Over 10 years of Amateur Radio related articles, reviews, projects and much more.

Just scan this QR-code with your cellphone camera or click on https://ve7sar.blogspot.com/search/label/The%20Communicator

...more 2meters

Bob Witte K0NR

Monitor marine VHF near the ocean

When on a road trip, I usually monitor the 2m FM calling frequency, 146.52 MHz. For the most part, that frequency is pretty quiet but sometimes a fellow traveler, camper, SOTA activator or random ham shows up on frequency. I don't usually bother with tuning into local repeaters as that requires frequent adjustment of the radio while cruising down the highway.

Our RV has an Icom IC-2730A transceiver that covers the 2m and 70 cm bands. This radio has two receivers, so one receiver is set to 146.52 and other one is set to "something else." Sometimes, I'll go ahead and put one of the local repeaters in the other receiver, especially if we are going to hang out in one location for a while.

When driving near coastal areas, I often put the second receiver on the VHF Marine Channel 16 (156.80 MHz). This is the International Hailing and Distress Frequency for marine radio. You will hear boats calling each other on this channel, then switching to another working channel. It is also common to hear the U.S. Coast Guard come on the air with an announcement. (The USCG may say switch to Channel 22 to hear the announcement.)

Some other useful marine frequencies:

- Channel 22 157.100 MHz Coast Guard Liason Channel
- Channel 68 156.425 MHz Non-Commercial Working Channel

The complete list of VHF Marine frequencies are available here: https://www.boatsafe.com/us-vhf-marine-radio-channels-frequencies/

~ *Bob K0NR*

Editor's note: *Please remember that you are only permitted receive on a non-amateur frequency. Transmitting is not permitted on a radio that is not type-approved.*

Canadian & U.S. VHF Marine Radio Channels and Frequencies

When you're out on the water, it's essential that you're familiar with VHF marine radio frequencies and channels. The marine industry specifically uses the VHF frequency range for communication. VHF stands for Very High Frequency, and it's used for ship-to-ship, ship-to-shore, and even ship-to-aircraft two-way communications. There are plenty of marine channel frequencies, and a ... Continue reading

RAC News

Announcing the new RAC Web Logs Submission System / Site

The RAC contest website has a form to upload your Cabrillo formatted log to the RAC Contest Management Teams Web Log System for log checking and verification of field data. The process checks your log for the required field data, reports any errors and allows you to select from the valid field options if errors are detected as well as making in-line corrections to QSO data should errors be detected.

Once that process is completed, the log is sent to the server and an email is sent to you confirming your log has been received. Optionally, you can have the updated log file sent as part of that email should you have had to make changes or want a copy of the log that will be processed.

Thanks to Bruce Horn, WA7BNM who has created a set of web forms to manually enter your RAC log data if you used paper logging or logging software that doesn't produce a Cabrillo file. Here are the links to the Canada Day form and the Canada Winter form pages on his web site.

The Radio Amateurs of Canada Contests and Awards Committee (RAC-CAC) is pleased to announce the implementation of a new contest log submission system.

This system is designed to allow you to directly submit a Cabrillo-based log file as your official contest entry form for both the RAC Canada Day Contest and the RAC Canada Winter Contest.

The system follows the key principles for log submission that are now highly common in radiosport contesting.

The web-based application and its homepage interactively walks you through the process of submitting your log. The system also provides a helpful Frequently Asked (FAQ) questions page for those that need additional instructions about entry categories and answers to general questions regarding those categories.

This system will be available commencing with the RAC Canada Day Contest on July 1, 2021. If you would like an early look at the log submission system please visit: https://contest.rac.ca/

For the 2021 contesting season we will still accept email logs via the published email addresses but will be looking to phase that method out in 2022.

https://www.rac.ca/new-rac-contest-log-submission-system/

Should you encounter any issues with the new system, please report any issues directly to Bart Ritchie, VE5CPU at ve5cpu@rac.ca

~ *RAC*

Solder Splatter

John Schouten VE7TI

A shack and grab 'n go power supply

What do you use for power in your shack? An analog power supply? Digital? Whichever you use, I am now a strong advocate of not using a dedicated power supply at all, but instead using a battery box. In this article I will describe the unit I built (version 3) and the research that led me to the contents included in the box.

The most reliable power comes from a battery. There is no hum, nor RF artifacts. The only stipulation is that you keep it charged so that it is ready to go when you need it most… when the power goes out.

Let's start with the basics

The lead-acid battery hasn't changed much in 160 years.

Since it was invented in 1859, the same 160-year-old technology still starts your car and nearly every car around the world, with minor changes here and there. It's still thin lead plates, sulfuric acid and water (plus a durable, polypropylene case.) Small tweaks and adjustments played out over the years. Some are even sealed so you don't need to add water. Despite these tiny developments in across a century and a half, French physicist Gaston Planté could step out of a time machine and still recognize his invention in 92.4% of the US automotive market. He might be surprised how little the lead-acid battery changed in 160 years.

Because everything else has.

Don't misunderstand, properly maintained, lead-acid batteries work well for ham shack power, but there are better battery technologies available today. I use a 35 amp/hour sealed AGM battery. This is a type most commonly used in large IT systems for emergency power.

An AGM battery is a car battery designed for two jobs: delivering powerful bursts of starting amps and running electronics for a long time. And here's the big deal: They tend to last longer than a regular flooded battery.

The acronym stands for "absorbed glass mat" and that's one of many improvements

Shown is a battery box available in the US. It costs about US$ 75 plus shipping not including the battery or charger. Mine has more features and cost about C$ 40, shipping included.

made to Planté's original train light battery. Glass mats, cushioning the ultra-thin lead plates, will squish like a sponge. In turn, manufacturers can squeeze more glass mats and lead into one battery. More lead equals more power. Plus, that squish factor means the battery's insides are packed tightly.

AGM batteries also have valves regulating the amount of hydrogen and oxygen gas allowed to escape during charging. They fall under a broader category of valve-regulated, lead-acid (VRLA) batteries, typically used for storing a lot of power for a long time or for long-running power uses.

Developed in the late 1970s, AGM batteries mostly served as backup power for telephone boxes and early computer rooms. Their use expanded over the decades to include motorcycles, military, aircraft, submarines and power banks for offices.

Over the course of their lifespan, AGM batteries can start an engine more than 60,000 times. That's more than three times the starts you'll get out of a conventional battery.

And AGMs recharge faster than typical batteries...

Because of their absorbed mats, AGMs withstand shaking and vibration better than typical batteries. They're also listed as spill-proof, meaning the regulations are more relaxed about transporting them by air or by road.

For 35amp/hour they start at about C$130 (unless you have an IT friend who can get you a good cast-off).

What is meant by the battery capacity in Amp/Hour? When it comes to judging battery life, one of the most useful tools we can use is the battery's amp hour rating. However, while amp hours can tell us about the battery's capacity, they don't work exactly the way you might expect. As with most things, the calculations that go into battery building are more complex than the average person cares to know.

Before you can compare batteries, you first need to know where to look for amp hours on your battery. If you are looking at deep cycle batteries, the amp hour rating will be clearly displayed on the battery or on the associated sales information. If you are unable to find an amp hour rating on the battery you are looking at, it's probably because you are looking at a starting battery which is not built to provide continuous power in amp hours. Make sure you're looking at the right type of battery.

Amp hour is the rating used to tell consumers how much amperage a battery can provide for exactly one hour. In small batteries such as those used in personal vaporizers, or standard AA sized batteries, the amp hour rating is usually given in milli-amp hours, or (mAh). For large batteries, the rating is abbreviated as Ah. Most deep cycle batteries will tell you the Ah rating at multiple C ratings. The C rating tells you how many amp hours the battery can provide for a very specific period of time. For instance, at C/5 a battery might safely provide 26.8 amp hours. This means that is supplies 26.8 amps in the duration of 5 hours without dropping off. Meanwhile, the same battery may safely provide 36 amp hours for a period of 100 hours. Depending on the amount of use you intend to get out of your battery (daily versus sporadically), you will want to compare amp hours for different C ratings. However, if you aren't sure which C rating to use, it is best to go with the C/20 because it is the middle ground and will give you a general sense of battery performance.

You may be wondering why it is that a battery provides more power when it runs longer, rather than less power. It would be natural to think that a battery running for 100 hours should provide fewer amp hours than a battery that only runs for five, because the battery must preserve power to

make it last. The truth is that rapidly discharging batteries causes them to produce a lot of heat. This heat negatively affects the battery's efficiency. Thus, when you rapidly discharge a battery with a C-5 rating, you are losing some of its available power just because the battery gets hot. Meanwhile, the C-100 battery is discharging at a much gentler pace and will be far more efficient. Check out the video at https://youtu.be/cxkVxi9P0EA

Knowing how many amp hours your battery provides is the key to getting a battery that will support you through your Amateur Radio activities. You don't want to buy a battery that is short on capacity.

There are many very efficient battery chemistries appearing, driven by research into making more effective batteries for electric vehicles. While excellent for Amateur Radio use, they can be very expensive and beyond the budget of many hobbyists *[see the graph below]*.

I selected a 35 Amp Hour battery, although I also have a 60 Amp Hour. The difference aside from power capacity and weight is transportability. The smaller battery is not a great strain to move yet it has powered my radio for 12-hours of continuous contest use. The larger can make it through an entire field day.

Abbreviations Used:
LTO—Lithium Titanate Oxide
LTF—Lithium Titanate
LMO—Lithium Magnesium Oxide
NMC—Lithium Nickel Manganese Cobalt Oxide
LCO—Lithium Cobalt Oxide

Right: The circuit breaker and Amazon sourced panel has all I need:

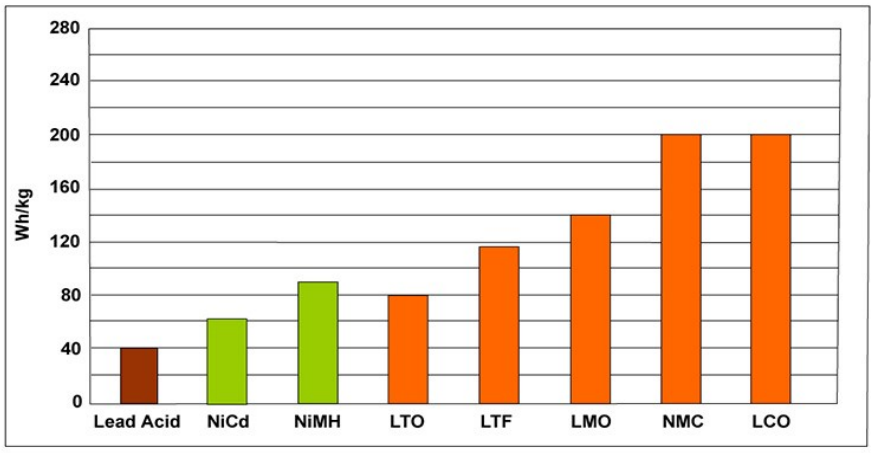
1. *On/off switch*
2. *Volt meter*
3. *12-volt accessory socket*
4. *Twin USB 5-volt sockets to charge a phone, etc.*

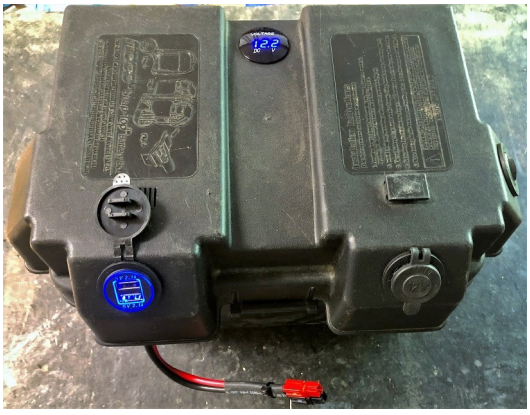
Back to the project… the box

Battery boxes come in a variety of sizes. I selected a standard battery box sized for my AGM battery with enough space to mount the additional components. It was bought from Amazon.ca for less than C$17

The meter and sockets

Also found on Amazon was a 4-in-1 charger socket panel that included a LED volt meter, two USB sockets, a 12-volt accessory socket and an on/off switch for C$18. This was far less than purchasing these accessories separately. Each is mounted in a one-inch hole and is easily removeable by loosening the rear nut. I didn't use the panel for lack of space but chose to mount each socket in the battery box lid individually.



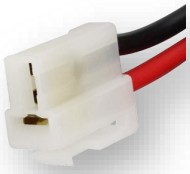


Above: The closed box with the switch, meter, USB charging ports and 12 volt accessory socket. Below: Internal wiring with the circuit breaker, one main heavy gauge wire and four Powerpole accessory sockets.

Protection

Rather than using fuses, which over time can develop voltage-dropping oxidation, I invested in a 12-volt circuit breaker for the main power bus. Should it trip, I merely have to reset it rather than hunting for a replacement fuse.

Powerpoles



All of my 12 volt equipment now uses standard Anderson Powerpoles for their supply. Although I remove the factory 'T' connector *[right]* from my radios, I don't throw them away but also solder on Powerpoles. This gives me an adapter for those instances someone is using a factory radio not yet converted to Powerpoles.

The box has one dedicated heavy gauge supply wire for a transceiver and a bank of 4 additional outlets for other 12-volt devices.

Other adapters and accessories

In addition to the 'T' connector adapter I also carry the following in the kit (yes, they all fit beside the battery) and all are terminated in Powerpoles:

- 12-volt female accessory (cigarette lighter) socket
- 12-volt male accessory (cigarette lighter) plug
- 12-volt 5.5mm x 2.1mm power socket. The size commonly found on 12 volt accessories
- 12-volt 5.5mm x 2.1mm power plug. The size commonly found on 12 volt accessories
- A 12-volt LED light - automotive accessory plug (bought for C$2 at the dollar store)
- An inverter that plugs into an automotive accessory plug and provides 110-volts AC at 100 Watts. This is more than sufficient to power my laptop computer.

Charging/timer

To maintain a charge on this kit at home I use a Battery Tender Power Plus 3 *[photo next page]*. This 3 amp fully automatic battery charger provides a full charge to your battery before

switching to float mode to maintain proper voltage levels without overcharging or damaging the battery. It is compatible with lead-acid, flooded or sealed maintenance free batteries (AGM and gel cell) and allows you to recharge 6 or 12 volt batteries with the push of a button. It is compact and lightweight even in small storage spaces. I have it attached with a digital timer that comes on for 2 hours in the middle of the night.

This charger and maintainer is spark-proof during lead connection and automatically detects reverse polarity to ensure a correct, locked-in connection before providing power.

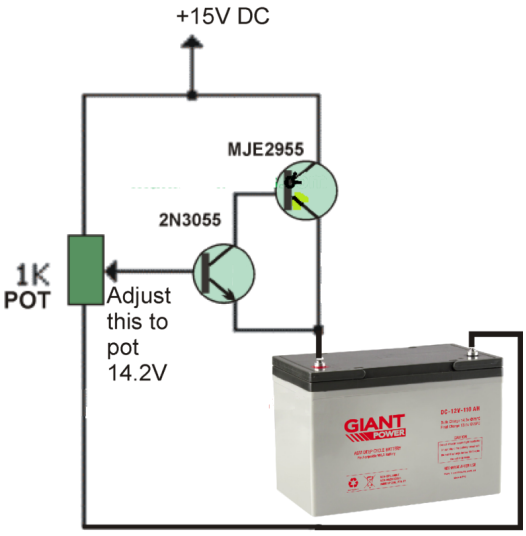
On the go I carry a Canadian Tire wall-wart type automatic battery charger module because of its smaller size. It doesn't have all the features of the Battery Tender but cost less than C$20 and it tops up the battery if needed. When necessary, I have also charged the battery from my vehicle's 12-volt power.

There are many similar charging devices on the market and there are easy to build circuits, some of which we have featured in previous issues of The Communicator. They comprise only a few small components and completed are probably small enough to build into the battery box… a future improvement. *[see below and: https://makingcircuits.com/blog/12v-100ah-battery-charger-circuit/]*.

Its nice to have all my power needs contained in one box, ready to go at a moment's notice. I haven't used either my analog or digital 110-volt power supplies in several years. I may have to list them for sale before long.

~ John VE7TI

Above: There are lots of useful accessories, such as this LED 12-volt light. Below: My collection of handy jumpers and adapters for various configurations I might need. Note the small inverter to provide 110 volts at 100 Watts.



Left: An easy to make charging circuit suitable for AGM and many other batteries.
Right and below: Charging/maintenance options

Setting up the IC-7300 for FT8

In this video Hayden VK7HH shows how to setup the IC-7300 for the WSJT digital modes FT8 and FT4

Got a Icom IC-7300 you want to use on digital? I will show you exactly how to setup your Icom IC-7300 for use with WSJT-X and other digital modes such as FT8. These are my settings on my radio that work perfectly for WSJT-X.

Timestamps:

0:00 Icom IC-7300 SETUP for WSJT/Digital Modes

1:26 Settings in the IC-7300 that need changing

4:29 Switching between SSB and DATA modes

5:15 Configuring WSJT-X for use with the IC-7300

7:43 Adjusting audio level in WSJT-X tips

Watch Icom IC-7300 SETUP for WSJT/FT8 DigitalModes (Easy and Simple)

Other Ham Radio DX videos:
https://www.youtube.com/c/HamRadioDX/videos

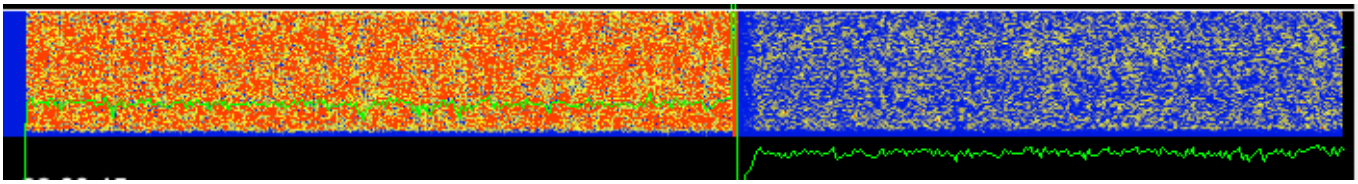
~ Southgate Amateur Radio News

VE7ZD: Success with a new antenna

I have the new antenna on the air, so far on meteor scatter on 6m this morning. It is performing far better than my old antenna. It makes an amazing difference due primarily to reduction in extraneous noise. I am seeing signals that I never saw before as they were obscured by the large amount of urban RFI around here. I would say that I am decoding about twice as many meteor scatter reflections as before.

An LFA has a much better plot with reduction in sidelobes, hence it is able to reject off-axis interference much more effectively. My noise level here is down about 7 dB from before, in some directions 10 dB quieter. That is about a reduction by about 5-10 times. This is based on the noise floor as shown on my panadapter.

Here's a screenshot of the noise level on the old (left half) and new (right half) antennas:



The standard Yagi on the left, the LFA on the right. Same frequency and mode, same antenna heading. Amazing difference! RX is much better, as described above, but the other guys on the MS group say that I am getting "out" much better as well. This is confirmed through reference to PSK Reporter.

All in all I think that this is one of the best changes to gear that I have made.

~ Kevin VE7ZD

Measurements With The NanoVNA

Arie Kleingeld PA3A

Part 5—Measuring low impedances

Introduction

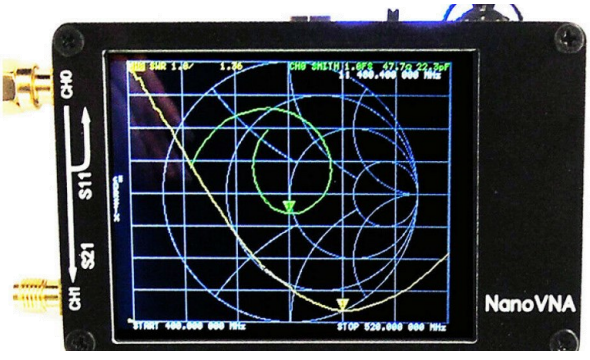
The nanoNA's are made to measure impedances associated with the 50 ohms that are so important to radio amateurs. Experts say that as long as the measured values are between 5 and 500 ohms, the nanoVNA still does very well.

In part 2 of this series of articles [The Communicator March-April 2021] I discussed measuring high values (470 Ω, 4700 Ω and 10 kΩ), and how best to tackle this with the nanoVNA. In this part 5 we look at the accuracy of measured values of 1 Ω and even a little lower.

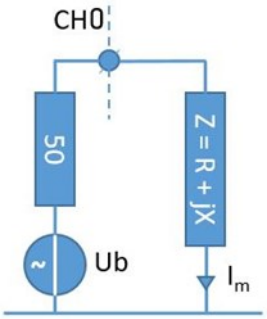
Measuring low impedance values requires some accuracy. If you measure a resistance of 1Ω with your regular multimeter, then that is already quite a task if you want to do it accurately. And an additional few tenths of an ohm can appear if you don't handle your measuring leads well. For example, in the case of the nanoVNA, this means careful calibration (especially the 0 ohms) and cables in the measuring setup cleaned and tightened as well as possible. It also does not hurt to redo the low-level measurements a few times a day later to ensure accurate reproducible measurement.

Measurement

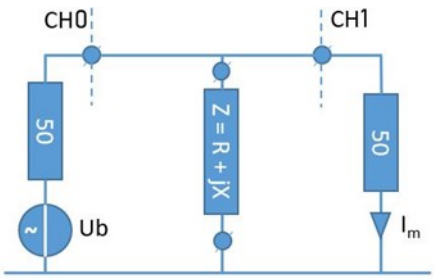
We're going to use two methods to measure low impedance values.



Method 1: S11 R+jX



Method 2: S21 damping measurement with Z parallel



Method 1, the S11 measurement, is straightforward and is used by most radio amateurs to measure the SWR, among other things. You can immediately read the value of Z, R and X easily via nanoSAVER, one of the Windows programs that works together with the nano. You can export the S11 measurement in an S1P file. The formulas for converting the S1P file values to R + jX are in box 1.

Method 2, the S21 measurement, initially looks a bit strange. Here the insertion loss is measured where the impedance to be measured is parallel. To give an insight into this method of measuring, a small explanation. For the current Im measured in CH1, the larger the Z, the greater Im, and thus a lower loss is measured. Bij Z = 0 (short circuit) Im will be equal to zero and the CH1 input will not measure anything that amounts to a very high loss. The measured S21 = Dr + jDi can be exported in an S2P file. You will find formulas in frame 2 to convert to Z = R + jX.

Why is it so hard to measure with that S21?

The reason is that professionals claim that for low impedances the S11 measurement loses accuracy. The characteristic S21 measurement provides higher accuracy for low impedances.

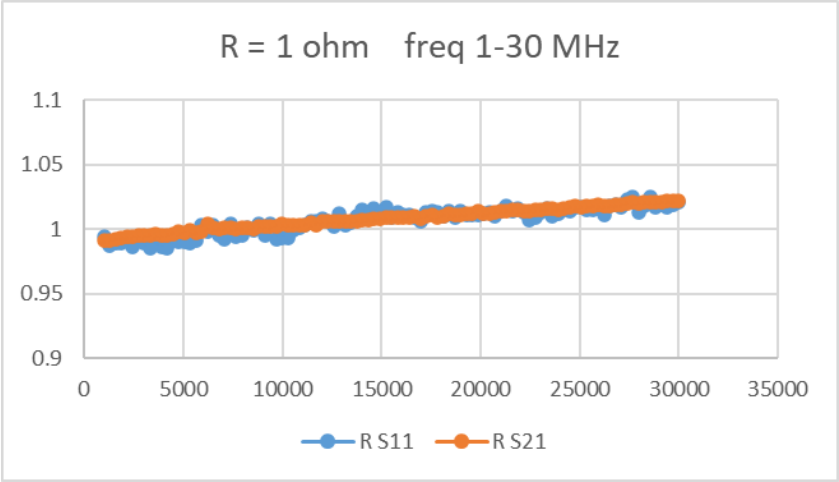
And that sounds plausible to me as an amateur. After all, if the range of the S11 R+jX measurement goes from 0 ohms to many kilos of ohms, then e.g. 0.33 ohms is close to the 0 ohm limit. If you then measure the S21 (loss) with that 0.33 ohm parallel (method 2) then approximately 37.5 dB of loss results. This appears to be in the middle of the range of my nanoVNA H3.2, which can measure between 0 and 85dB attenuation in the HF frequency range. We will see below whether that also provides a more accurate measurement value for R+jX.

Measurement of 1 ohm and 0.33 ohms and 0.20 ohms with S11 (R+jX) and with S21

In this article we will therefore test whether the S11 R+jX measurement meets the low resistance values and whether the S21 measurement gives a better measurement result than the S11 measurement. The different resistance values are made with standard solderable 1 ohm resistors that are set in parallel for lower resistance values.

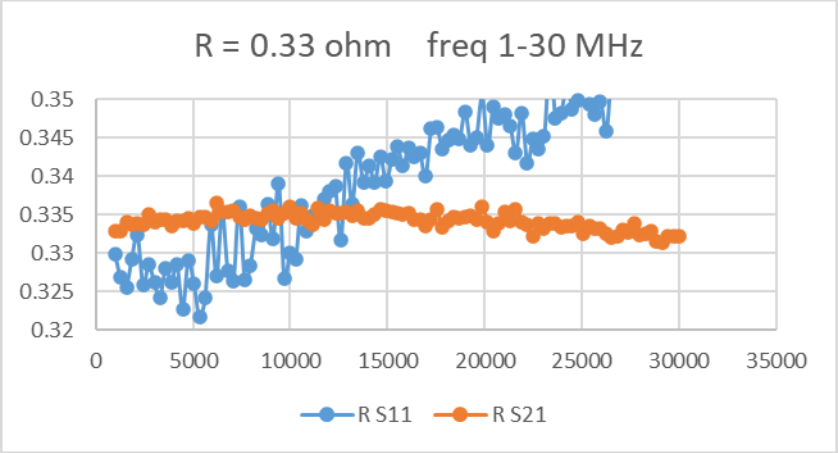
The photo *[left]* shows the simple measurement setup for the S21 measurement of the 0.2 ohm value. Five 1 ohm resistors are soldered in parallel.

The graphs of the resistance values (R S11 and R S21) resulting from the two measurements (with S11 and S21) are grouped into one graph per value . The charts were created with Excel, based on the S1P and S2P files. The reactance (X) is omitted from the graphs for comparison of the R values.

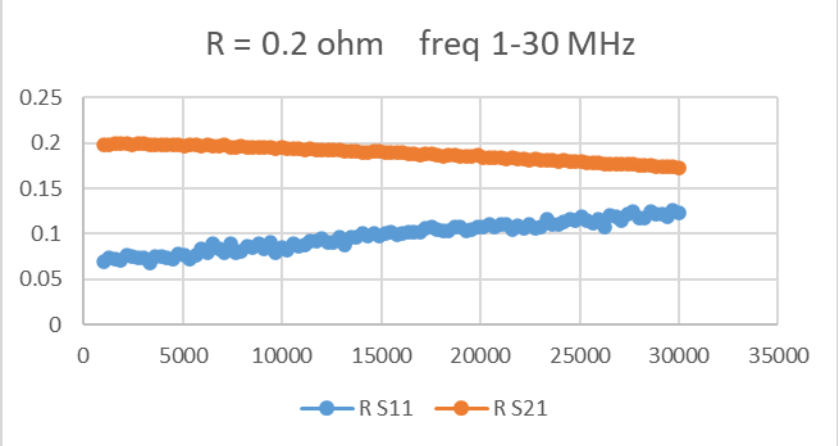


Results

The results in the graphs speak for themselves. For a value of 1 ohm *[top]*, both methods work well. A class gadget that nanoVNA! Within a few percent, the measured values are around 1 ohm over the entire HF range.



The deviations between the two methods only occur at the lowest resistance values. The S21 method really turns out better. The 0.33 ohm with the S21 measurement *[right]* clearly works out better in the graph than the S11 measurement.



At 0.2 ohms, the differences are even clearer although the 0.2 ohm also shows some deviation with the S21 measurement *[bottom]* if you look at the entire HF range.

With an SMD setup, the graphs might have been a bit nicer, but still... I have no aspirations to start a measurements lab. If you evaluate it even further, you should also remember that this is loosely measured, on the shack table, with an older type of nanoVNA (H3.2). In this, the internal 50 ohm reference value is not yet very similar to the actual 50 ohms. The newer type VNAs are a bit better.

Finally

The following topics have been discussed so far in this series:

1. A method to determine the characteristic impedance of a transmission line/coax
2. Accurate measurement of high impedance values > 5 kohm
3. Experiences measuring common mode chokes (application of topic 2)
4. Determining the type of core material of a toroidal core
5. Measuring low impedance values < 1 ohm

There are many other applications in which you can use the nano. However, the intention was to look up a few angles in the use of the nano in this series and apply them. We looked at the possibility of measuring values in so-called export S1P and S2p files from the nanoVNA and then processing them in Excel. The necessary formulae shall be included where necessary .

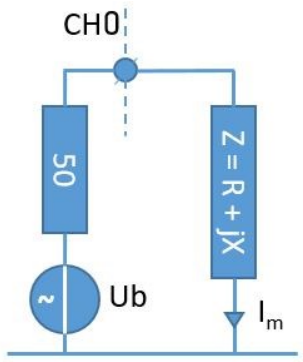
For questions and/or comments I am always available.

~ 73, Arie PA3A

Box one

S11 = Dr + j Di. Dr and Di values are exported directly from nanoSAVER by means of an **S1P** file. R+jX can be calculated using sub-existing formulas. The principle of this is explained in part 2 of this series.

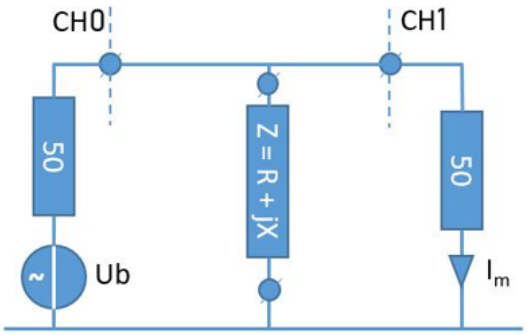
$$R = 50\frac{1-(Si^2+Sr^2)}{(1-Sr)^2+Si^2} \qquad X = \frac{100Si}{(1-Sr)^2+Si^2}$$



Box two

S21 = Dr + j Di .
Dr and Di values are exported directly from nanoSAVER by means of an **S2P** file. R+jX can be calculated using the formulas below.

$$R = 25 * \frac{Dr(1-Dr)-Di^2}{(1-Dr)^2+Di^2} \qquad X = 25 * \frac{Di}{(1-Dr)^2+Di^2}$$



An Amateur Radio Saga

The long road to freedom

Marilyn Sergi VE7OSS

Marilyn was licenced in Alberta in 1991. Her call sign was VE6SSS, commonly called… SUGAR SUGAR SUGAR.

Mario was also licenced at same time. His call sign was VE6WOP, of course.

We lived at Pigeon Lake at the time, about 60 miles SW of Edmonton. We were CBers for many years and had many country contacts.

Marilyn had worked in telecom at CYXD Edmonton Airport for several years. She heard the radio ops guys all day and night on her shift work. Everyone she knew worked for DOT, the Department of Transport, as it was known then, and Edmonton Aeradio is what it was known then, as well. The operators transmitted all sorts of message one could imagine: air traffic was #1 of importance, flight plans, flight position reports, weather conditions anywhere a pilot needed to know. There were 4 positions in Air Radio: first three were all voice on HF only, working aircraft. Fourth position was CW.

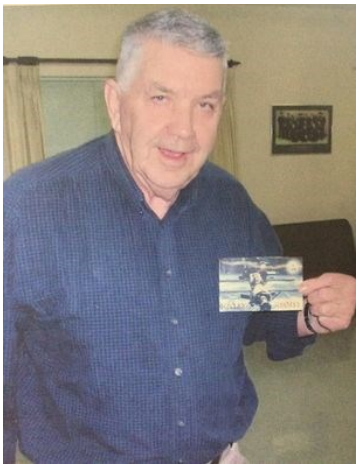
The best op we ever had was an aboriginal kid from Coppermine. His name was Tom Aneroluk and he wore moccasin slippers, beaded by a talented woman he knew. He sat at his position, which was right angled from the main bench as he had to type every message onto special forms. Yes, typewriter type. He could listen to the incoming messages on his headphones, type his messages without mistakes, and keep time with his moccasined foot at about a rate of 100 words per minute… smoke hung low over those smokey smelling moccs! He was a phenom on CW and he loved it.

Marilyn really enjoyed working shifts with Tom, Brad Pool 6NG, Fred Joyce 6HQ, and two females, calls forgotten. They had both been trained during WW II and came to us in civilian times. Peggy and Lila were their names. Lila was a whiz also. There were other ops but those are a few of note.

Marilyn worked in the teletype room. She and two other operators fed ciphered, taped and personally typed info into machines up to the Pinetree, and Cambridge Bay stations on the DEWLINE… Distant Early Warning stations, it was the time of Iron Curtain days, Bay of Pigs, and a lot of interesting and foreboding information was learned. All staff had to take the Code of Silence and Restricted Information. Marilyn nor any of those pals have ever been released from it.

The reason Marilyn is called Sugar Sugar is because she was trained in the code in the ‘60s. It went like this: Able, Baker, Charlie’s, Dog etc. Yes, much like the Americans. And ‘S’ was Sugar. Across Pigeon Lake from where the Sergi’s residence was, was the DOT tower designated CYSS. When given her choice of call signs, Marilyn decided on SSS because she was located eyeball to eye at SS. And so it was.

As a young boy during WW II in his Italian home on the Istrian Peninsula, Mario pretended to be a signaler. He climbed a tree in his backyard, strung up and piece of wire and attached it to a board. He didn't have a 'key', nor know exactly what one looked like. But he was a clever boy and when the Germans or Americans flew over during their bombing runs, he would climb up and pretend to be sending messages. Yup, you got it. He got ratted out and the Germans who were storming down the Peninsula heard about it. A squad of soldiers and all their fine weaponry broke down the door, and were about to shoot the lad and his mother. Fortunately, Signora Sergi spoke fluent German and begged them to hear her out. It was scary times… but they acceded after she showed a picture of her nephew in German uniform.



But they hauled Mario's makeshift key and cut down the tree, plus a whole bunch of yelling and arm and gun waving.

Mario never forgot that and always thought he might pursue it. But he had a Long Road To Freedom ahead of him before he ever thought of it again.

Marilyn worked at the airport, Mario slung beer in the hotel where all the airport ops spent their off duty time. Marilyn did not! It was a friend who introduced them in 1959. They passed a lot of 'traffic' over the course of 3+ years before deciding to marry.

Marilyn went on to work in Telecom at CYEG, the new airport in south Edmonton. Eventually they had children and a grandchild. Their daughter, Marina became a licenced ham, VE6RIM, her husband became VE6TBH and later got a 2-letter call. Marina's girl got her licence VE6MIR. So it runs in the family.

Mario's personal story has been written and published in the 'BOLETIN' - Bulletin of the Club Giuliano Dalmato, of Toronto. His story is in English and runs over two pages. It is BOLETIN #185 pages 7-9. It is a serial story and has a third episode about to be published. You might be interested to also know the Italian Government is having made special Commemorative medals for family members of the 'FOIBE' Massacre. Mario will be a recipient.

73 and 88's to all of you and thanks for reading the Sergi family saga.

~ Marilyn VE7OSS

Ham Hardware

Al Duncan VE3RRD

My search for the ultimate VHF/UHF station

Although written a few years ago, this article by Al VE3RRD still has sound principles when it comes to setting up a VHF/UHF station, which is probably the most asked question after a student passes the Amateur exam.

On thinking over what type of VHF/UHF station I would want to set up for mobile/home use, the following considerations were explored.

1. The cost of having multiple high quality transceivers in my car, and house, and for transportable/emergency use.
2. Weight and size of an AC power supply.
3. The ease of disconnecting and reconnecting power from different sources and at different locations.
4. Emergency power from a battery or generator.
5. The desire to have something transportable that could be set up anywhere (such as for ARES, communications support for local events, Field Day etc.
6. Mobile, base station and portable antenna systems for 2M and 440 that weren't overly expensive. 7. How to get around the high levels of intermod and other interference that would be experienced.

Cost

Since like most of us, I don't have unlimited funds to spend on new ham equipment (the last mobile rig I bought was an ICOM IC-28H purchased new in 1985), I wanted something reliable that could be used for any application. Since most of my existing equipment is ICOM, I looked around for what this manufacturer had to offer. I didn't necessarily want the newest rig (not enough time for users to find all the bad points about it), but wanted something modern with a detachable control head.

The ICOM IC-208H dual band mobile rig seemed to fit my requirements (although it is several years old now - first introduced in

2003) and happened to be on sale at Radio World in Toronto (this transceiver has been on sale for as low as $329). Other manufacturers also have excellent choices in 146/440 MHz rigs, just remember to check for user comments on a site such as eHam.net before committing to buy.

AC Power Supply

An old style transformer (linear) power supply may be an excellent choice for a fixed application, but for something compact and lightweight, a switching type is the way to go. Several good switching P/S have been introduced recently, most notably:

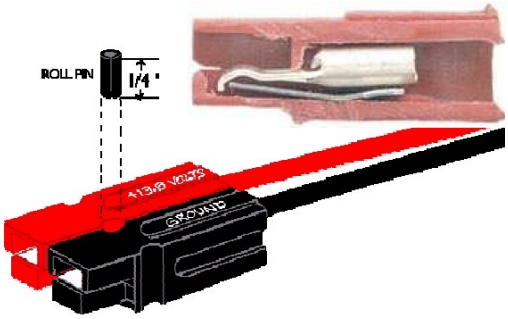
The Alinco DM-330MV compact switching power supply rated at 30A continuous output (eHam review), which is often put on sale by Ham Radio stores such as Radio World. Another good choice is the Samlex SEC1223 rated at 23A continuous output.

The Samlex unit (eHam review), which can be found on some US ham equipment discount websites (such as Universal Radio Inc.) for as little as US $90 (you will find it for about $179 at dealers in Ontario). With dimensions of 2.4 x 7.3 x 8.7 inches and a weight of 3.5 pounds, it is a good choice for a "portable" high current power supply. This unit can be further improved by performing the ZL2DF mod which adds additional filtering to the DC output lines (eliminates birdies noted on 40, 80 and 160M HF).

Don't skimp on the power supply capacity, you may think you will never need 23A but this power supply could be used to power a 100W HF transceiver, and the cost of up-sizing on your initial purchase isn't that great. Check out DL2YEO's design here and here to build your own switching power supply.

DC power connection

The "official" power connector for ARES and other group compatibility is the Anderson Powerpole, available in 15A (PP15 – 1395/1395G1) and 30A (PP30 – 1330/1330G4) versions. You can get a package of 10, (5 black and 5 red housings, with 10 – 15A and 10 – 30A contacts) for US$13.99 from Powerwerx and other Amateur Radio suppliers.



Housings should be mated according to the diagram to right, viewing from the contact side (opposite the wire side), tongue down, hood up, RED on the LEFT, BLACK on the RIGHT. Also notice the 3/32-inch-diameter roll pin, 1/4 inch long, is used to keep the housings from sliding apart. Better quality crimping tools such as the PWRcrimp are available.

The big advantage with the Anderson PowerPole connector, is that it is the contact piece that determines the current handling rating – the plastic

body is the same for the 15A, 30A and 45A versions. This means, for example, that a 15A transceiver connector can be plugged into a 30A power supply connector. The different current versions are rated for different sizes of wire: #16 to #20 AWG for the 15A, #12 to #16 AWG for the 30A (although 10 gauge can be squeezed in), and #10 to #14 AWG for the 45A contact. The same plastic body is used for the source and the load side connector. The connector is also "genderless" – when assembled as shown above (both source and load side), any two connectors can be plugged together, the polarity of the voltage will be correct since one connector must be turned over to plug into the other.

Another older power connector standard sometimes used (for lower current applications) is the Molex 1545 *[top right]*. These are not as easy to assemble and require soldering the male and female pins to the wire before snapping them into the nylon connector bodies. A special tool is required to extract the pins (if you put them in the wrong hole), although a substitute tool can be fashioned from thin-wall brass tubing from a hobby shop. The tubing slides onto the front of the female/male pin (must have thin enough wall to fit inside the hole in the connector body) and compresses the locking tabs so that the pin and wire can be pulled out the rear of the connector.

The cheap-and-simple non-standard connector

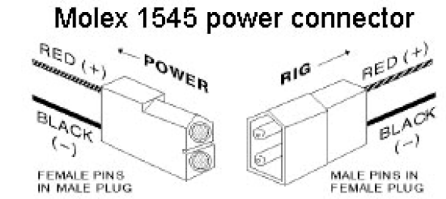
For lower current applications (15A or less), I have been using 4 pin, flat style trailer connectors *[center right]*.

By doubling up the contacts (2 for hot, 2 for ground) they seem to work quite well and can be found in many stores (about $4 for both halves). I have these installed on both the IC-28H and IC-208H power cords, and the mating ends on my AC power supply in the house and on the power cables in both of my vehicles and in my work van. Once I get some of the 30A Powerpole connectors, I will convert everything over.

Emergency power

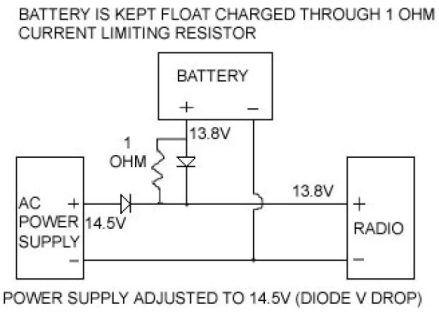
The most common method of powering a mobile rig during a power outage (outside of using it in a vehicle), is from a battery such as a marine deep-cycle type. The ICOM IC-208H draws up to 12A on high power, so a reasonably hefty battery would be required to power it for any length of time. The battery must be kept charged, either by the use of an automatic battery charger, or by float-charging it across the transceiver's AC power supply.

Float charging requires adding two rectifier diodes rated for the load current, and a battery charge current limiting resistor of 1 ohm. Note that the power supply must have the voltage adjusted higher by .7V (the drop across the diode) so that 13.8V will reach the battery (to charge it) and the radio. When the AC power fails, the battery will begin sourcing current to the radio through its diode. The only other issue is that the diode will reduce the battery voltage to the radio (by .7V), a 115VAC powered



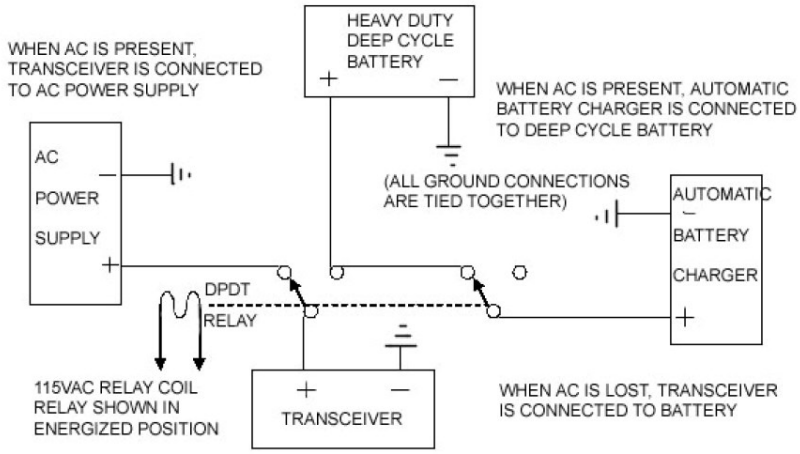
Molex 1545

Flat trailer connector



relay could be connected to bypass this diode when the AC fails. If the battery is a heavy duty deep-cycle type for example - after being partially or fully discharged, it should be recharged with an automatic battery charger before reconnecting it to the power supply for float charging. Just remember that you cannot connect your transceiver to the battery while it is being charged. Note that the Schottky diode has about half the voltage drop that a regular rectifier diode has.

The automatic battery charger *[below]* is a simpler solution, but power will not be available during the time it takes to connect the battery to the transceiver. A 115VAC relay could be used to connect the battery to the automatic charger and connect the transceiver to the AC power supply. Upon the loss of AC to the relay, it would be de-energized, connecting the battery to the transceiver (both the battery charger and the AC power supply would be disconnected). The relay contacts should be rated for 20A or more. Note that power to the transceiver will be lost for an instant as the relay switches, a 3000 or 4000 microfarad capacitor across the transceiver input could smooth this out.



The next problem is that most transceivers don't like it when the DC voltage drops to 11V or so during transmit, which will occur when using a deep-cycle battery (part of the discharge curve is below 11VDC). It will also occur if there are any voltage drops because of wire resistance or if any diodes are placed in series with the power supply output causing additional voltage loss below 13.8V. Use 10 gauge stranded for both +12V and the ground wire to reduce the voltage drop.

A device that fixes the low voltage problem is the "Electronic Battery Booster" from W4RRY (reviewed in October 2005 issue of QST). It is available for US$120. Another similar device is the MFJ-4416 Super Battery Booster.

A method sometimes used to prevent the battery voltage from dropping below the minimum required by equipment is to use a "seven cell" battery. The nominal terminal voltage of a six cell battery is approximately 12.6V; the nominal voltage of a seven cell battery is 14.7V. The float charge voltage of a 6 cell is 13.8V while that of a 7 cell is about 16.1V. The advantage is that the discharged terminal voltage of a deep cycle 6 cell battery is about 11V, while that of the 7 cell is about 12.8, an acceptable voltage for a transceiver. There is one problem though – amateur equipment (and other 12V electronic equipment) is not made for operation above about 15V. To prevent this during battery charging and while operating on the float power supply, several diodes in series must be switched in to reduce the voltage to the radio. Three diodes would be enough to reduce the 16.1V float voltage to 14V for the transceiver. A relay controlled by a voltage sensing circuit would be required to bypass the diodes as the battery terminal voltage

drops below 14V, and to switch the diodes back in when AC is restored and the 16.1V power supply drives the battery terminal voltage above 14V. Often though, after the battery has been partially or moderately discharged, the automatic battery charger will apply a voltage higher than 16.1V to obtain the required charge current.

Another possibility is to use a portable generator – either a 115VAC version or a 12VDC generator (check out this one made from a lawn mower). Many gasoline engines can be converted to propane. The battery would only be needed to power the transceiver until the generator could be brought on-line.

A short duration solution (for lower TX output power) is a portable car "jump start" unit such as the one I purchased from Princess Auto for $38 *[picture lower left]*. It includes a 15 Ahr sealed lead acid battery and a charger. The IC-208H draws about 4A on low (5W) power, about 6A on medium (15W) power and about 11-12A on high (55W) power.

Small gel cells (for example 7 Ahr), such as those described in "Care and Feeding of Gel Cell Batteries", are more suited for emergency handheld transceiver operation. Also refer to the eHam.net article on recharging handheld radio batteries.

The simplest solution for emergency power would be for me to use a large deep-cycle automotive battery and either the W4RRY or N8XJK electronic battery booster to power my IC-208H.

DC power wire size

Don't skimp on the gauge (size) of wire used to connect the transceiver to the power supply. This is especially important when using a battery for emergency backup – you want as little voltage drop in the DC power wiring as possible. 12 AWG, or better yet, 10 AWG should be used to connect to the transceiver. The American Wire Gauge Standard specifies that 12 gauge is suitable for 9.3A and 10 gauge is suitable for 15A, when using longer runs of cable. The calculator on their web page indicates that 10 feet of 12 gauge wire with 12 Amps load will have a 0.5V drop. If using 10 gauge, the drop will be 0.3V.

Table 3
W4RRY Battery Booster Efficiency

Input V	Input A*	Input W	Output V	Output A*	Output W	Efficiency %
10.3	24	247	13.7	16	219	89
12	22	264	13.8	16	220	84
13.3	20	266	13.8	16	220	83
10.4	11	114	13.8	8	110	97
12.1	8	97	13.8	6	83	86

*The current results, and derived data, are approximate since the available probe had a resolution of 1 A.

W4RRY Battey Booster

Transportable station

With a modern transceiver having a removable faceplate, like the IC-208H, the 3 parts of the radio that you must find room for in your mobile installation is the control head, the microphone and a small speaker. These can be temporarily attached with Velcro so that they can easily be moved with the radio. The radio itself can be located anywhere, and only needs 12VDC and an antenna connected in addition to the 3 parts mentioned. This leads to the question, "why mount the radio at all?" – why not put the radio and even the 12V power supply (such as the Samlex SEC1223) into a box with a handle. Installing the transceiver into a different location such as one of my other vehicles or my house then only involves:

Portable 'jump-start' unit

- Attaching the control head, speaker and microphone to the locations already prepared for them.
- Plugging the radio power cord either into the AC supply if located where there is AC available, or into the DC power cable already installed in the vehicle.
- Attaching the antenna coax, or mounting a mag-mount antenna if the antenna is not permanent

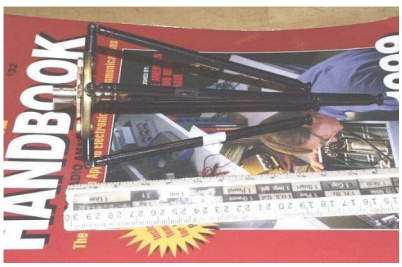
As a temporary or emergency setup, the control head, speaker and microphone would be mounted on the box so that the entire station could be set on a table and used. A list of Ham Radio emergency items can be found here.

Affordable antennas

Several antenna configurations should be considered:

- A permanent base-station antenna for use at home.
- One or more permanent mobile antenna installations in the most used vehicles.
- A magnet-mount antenna installation for more temporary mobile use.
- A portable antenna system that can be deployed for emergency use.

A folding 2m portable antenna



After looking around for a suitable dual band mobile antenna, I came across the TRAM model 1180 which can be purchased from Maple Leaf Communications (Bob VE3BFM) in Everett for $39.95. He also sells suitable NMO hole-mount and mag-mount hardware for it. eHam reviews were very favorable regarding both the 1180 mobile antenna and also the dual band TRAM model 1480 base station antenna which Bob also sells ($99.95). See also Amazon.ca.

For emergency use, a magnet mount mobile antenna can be placed on a metal ground plane (even several metal coat hangers will work), see my article "Cheap and Ugly Dual Band Whip" for how to convert an old cellular mag-mount antenna to a 146/440 antenna; or a two element quad (like that shown in "RDF and Hidden Transmitter Hunting") or J-Pole could be used. Quality ready made portable J-pole antennas are available from Maple Leaf Communications. You can make a good quality, high gain 2 meter yagi from an old TV or FM antenna. Even the Tape Measure Yagi could be used in a pinch *[all of these have been described in previous issues of The Communicator https://ve7sar.blogspot.ca]*.

A folding portable 2M antenna *[photo left]* could be made from four or six 21 inch or longer telescoping antennas for the ground plane radials attached to a brass washer (hole in center can be used for the antenna mount). A telescoping 5/8 wave antenna (made for a handheld) could be used with a BNC feed through for lower power applications.

Choice of coax connector

In most cases, the PL-259 UHF connector will work well for fixed and mobile transceivers, and may be your only choice when using larger coax such as RG-8 or RG-213. When using RG-58 style coax, another choice is the BNC connector. The BNC connector can be attached directly to many handheld transceivers, or adapters can be used to interface to the SO-239/UHF, type N, or smaller connectors such as the SMA, TNC or mini-UHF often used on modern handhelds. An emergency antenna with a BNC

BNC female *BNC male* *UHF/PL-259* *UHF/SO-239* *SMA male* *Type N male*

connector, and a half dozen adapters will allow you to attach your antenna to most amateur equipment that may be available for use. Likewise, a number of adapters to allow available antennas to be attached to your transceiver can be very useful. The most common being adapters to convert BNC and type N coax connectors to the UHF/SO-239 used on the average mobile ham radio transceiver. BNC male BNC female UHF/PL-259 UHF/SO-239 SMA male type N male

Although my Icom IC-208H uses a UHF style connector, my handheld (a Yaesu FT-50RD) uses an SMA connector (my old Icom IC-02AT uses a BNC connector). Hanging a PL-259 off of a UHF to SMA adapter (if such a thing were available) would be asking for damage to the FT-50. In my case, if I plan on using my handheld with my mobile antenna, it would be better to put a BNC connector on the coax and use the appropriate adapter to interface to the IC-208H or FT-50RD. Another option is to make up a short piece of RG-58 with a SMA male on one end and a SO-239 on the other.

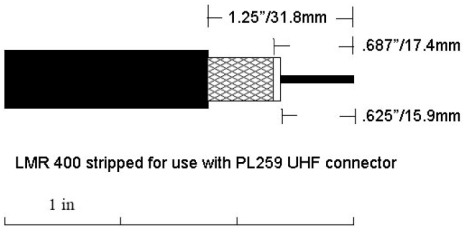
Choice of coax cable

The choice of what coax to use is a trade-off between diameter/weight/flexibility and signal loss for the frequency used. A 3db loss is the same as cutting your transmitter output power in half.

- For very short lengths, very small diameter coax such as RG-174 can be used. At 146 MHz, 10 feet of RG-174 looses about 1.3 db, and at 440 MHz, 10 feet looses about 2.5 db., costs about 35 cents/foot.
- For less loss/longer lengths, RG-58 coax can be used. The 146/440 MHz losses for 10 feet of RG-58A/U is about 0.61db/1.04 db. Note that RG-58 comes in two versions; standard dielectric RG-58C/U at about 25 to 30 cents/foot, and the better quality lower loss foam dielectric type RG-58A/U (you can find this at the same price as the C/U).
- The next step up is RG-8X coax with 146/440MHz losses of 0.45db/0.81db for 10 ft. and costs about 80 cents/foot.
- Larger RG-8/RG-213 coax has 146/440 MHz losses of 0.28db/0.51db for 10 ft. and costs about 75 to 80 cents/foot.
- A product called LMR-400 which is about the diameter of RG-8 but is much less flexible (100% shielded) and has lower loss can be found for about $1.50/ft. You may find lengths of this for less at a HamFest or on eBay. It is made for permanent installations, with losses for 10 feet of about 0.15db/0.27db at 146/440 MHz.

Only buy black outdoor (UV rated) coax, stay away from other colors such as grey (often seen for RG-8X) unless you plan to only use it indoors – sunlight will make the outer covering turn hard and brittle. Bulk quantities of coax cable such as RG-58 and RG-8 can be purchased from Maple Leaf Communications and from Durham Radio.

PL-259 UHF connectors can be attached to LMR-400 coax using the following guideline: Make sure to clean/sand the surface near the holes and the inner edges of the holes before soldering. Do that either with an X-acto knife



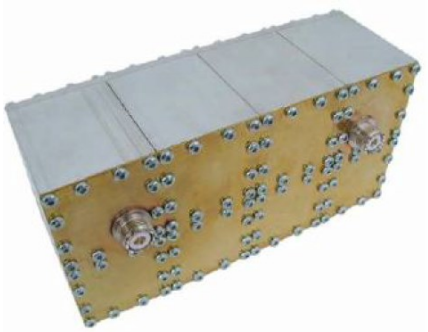
or a thin bamboo skewer with a small piece of #200 sandpaper wrapped around the end. I usually stick some resin into each hole that I'm about to solder, to help the solder flow. Use at least a 100 W iron. Let enough solder go through the hole onto the shield and heat it until it really flows well, but do not overheat the cable! Learning when to stop is the whole secret to making good connectors. After removing the iron make sure you wait a longish time (30 sec or so) for the solder to cool down before you move anything.

Interference protection

The broad-banded receivers used in most new transceivers are susceptible to interference from various paging/trunking and other commercial transmitters located everywhere today. Every city has its "intermod alley"; in the city of Barrie it is Bayfield St. near the Kozlov mall, and near the CKVR television tower to name two. My new IC-208H also experiences problems in these areas, although my old IC-28H (2M only rig) included a helical filter in the receiver, which kept most of this out.

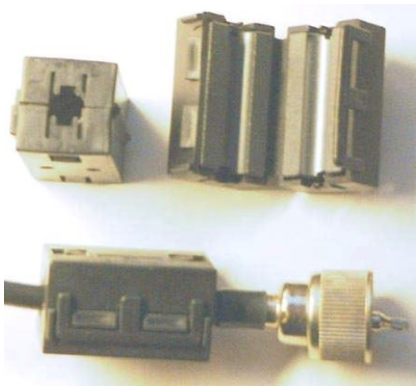
When providing emergency communications, the last thing you want is to not be able to hear the repeater or other emergency stations because of intermod clobbering your receiver. A quick method to check if the interference you have can be helped by adding a filter; is to add a 10dB attenuator in front of the transceiver. If the interference is gone or greatly reduced, then a band-pass filter will help. In this case (the most common) the intermodulation products you are hearing are actually caused by strong signals which can be outside the amateur radio band (for example paging transmitters located just below and above the 2M band). These signals enter through your antenna and mix together inside your receiver to create the interference called "intermod".

A type of interference that cannot be helped by a filter on your transceiver is when the mixing occurs outside your radio, possibly even on a paging transmitter tower. If the interference resulting from this mixing falls within the ham bands you are listening to, then the radio will receive it the same as any amateur repeater signal.



An excellent dual band filter covering 144-148MHz and 438- 450MHz (model DCI-146-444-DB) made by DCI Communications Inc. With a size of 4" x 4" x 8" and a weight of 3.5 pounds, it is small enough to add to my "box" containing the transceiver and power supply. The unit can be ordered directly from their factory in Saskatchewan. Unsolicited testimonials from owners can be seen both on their website and on eHam.

Another type of interference that can cause a problem, especially if the antenna is too close to the transceiver, is RF feedback. In this case the transceiver's own RF from the antenna gets back into the transceiver either directly through the radio enclosure or by riding in on the microphone or external speaker cables or even the DC power cables. Moving the antenna can help solve this



problem, and installing snap-on RF choke type filters on all cabling entering or leaving the transceiver enclosure can also help. The type shown to the right consists of a powdered ferrite material and is sized to fit RG-58 or similar diameter cables. Some additional info about preventing RFI (radio frequency interference) can be found here and also here.

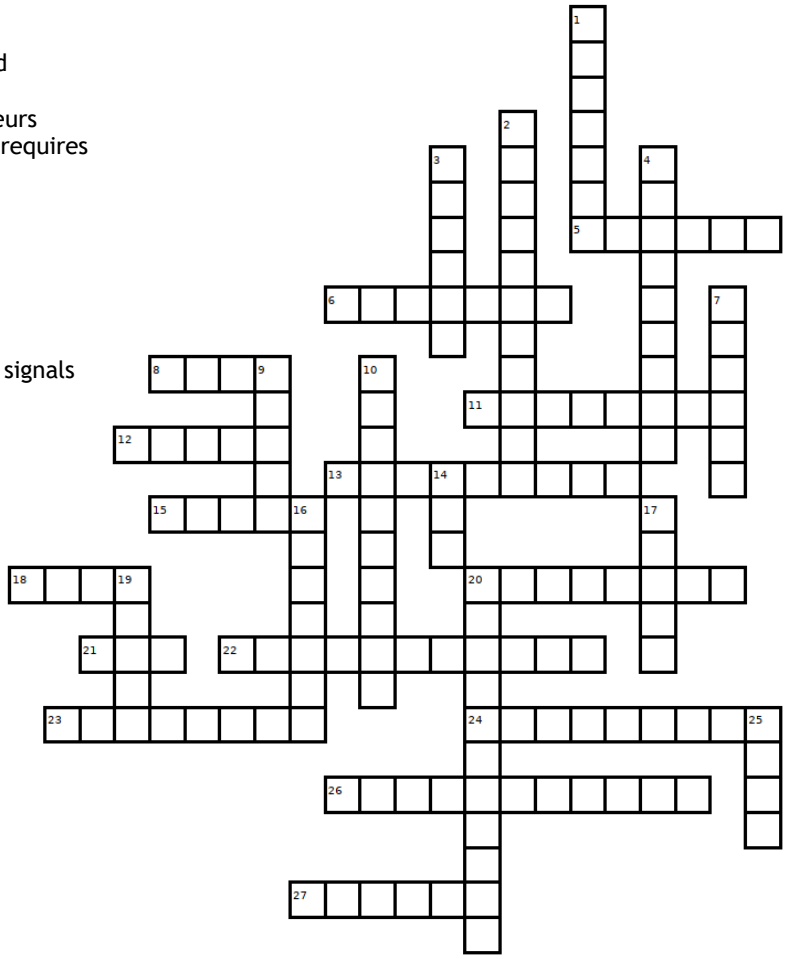
An excellent source of information is the K0BG website for mobile Amateur Radio operators.

~ *Al VE3RRD*

Amateur Radio Crossword

Down:
1. A type of cable with an inner conductor and outer braid
2. The opposite of resistance
3. A form of data transmission used widely by radio amateurs
4. The amount frequency spectrum or width that a signal requires
7. Crystal used in tuning
9. A CW transmission
10. An audio input device
14. A confirmation postcard
16. A wide-band receiving antenna
17. Originally a ship's radio room
19. To use voice communication
20. Receiver property that rejects off-frequency unwanted signals
25. Radio teletype

Across:
5. A type of amplifier
6. Mute or turn off the audio when no signal is present
8. A directional antenna
11. A coiled electronic component
12. An electronic Morse key
13. A modulation type
15. The receiver should do this when transmitting
18. Reflected in the atmosphere and bounced back
20. An upper and a lower
21. This circuit automatically switches to transmit
22. A Vertical antenna
23. Transmission cable
24. A component that passes AC but blocks DC
26. The ability for a receiver to pick up weak signals
27. A digital mode that is not packet



Solution on page 103

'Hamming' on the Computer

Windows 'sandbox'

Windows sandbox

Nervous about installing that new Ham program on your computer? Do you want a way to try it without risk to your files? I've recently discovered Windows Sandbox.

Windows Sandbox creates a secure "Windows within Windows" virtual machine environment entirely from scratch, and walls it off from your "real" PC. You can open a browser and surf securely, download apps, try them out, even visit websites that you probably shouldn't. Sandbox also includes a unique convenience: you can copy files in and out of the virtual PC, bringing them out of quarantine if you're absolutely sure they're safe.

You won't need to buy a second copy of Windows to use the feature either—though you will need Windows 10 Pro or Enterprise. The Home version doesn't support it.

Windows Sandbox, and sandboxing PC apps in general, give you a solution for trying a "utility" that may be malware, or a website that you're not sure about. You could leave those potentially dangerous elements alone, but with Sandbox, you can be a little more adventurous.

At any time, you can close Windows Sandbox, and when you do, anything left there is totally obliterated. If that dodgy website rains malware down on your Sandbox, all it takes is one click to shut it down, without harm to your actual Windows installation. Next time you launch a new version of Sandbox, it will launch a pristine version of Windows 10 to start anew.

I'm now using it to try programs before I permanently install them and have found it problem free. I have also installed virtual computers including a Raspberry Pi and Mint Linux. Each runs as if were an independent machine but leaves no trace and affects no other setting or programs when removed. Have a look at this video for more information:

https://youtu.be/VfdxcghDHo0

Icom memory manager

ICOM 7300 Memory Manager (a version for the IC-7610 is currently in beta testing) is an application for managing the memories of an ICOM 7300 HF radio transceiver using a Windows PC. It allows the user to read and save memory channels directly to the radio, or to save the memories to a disk file for future editing or as a backup. If you like you can have different sets of memory channels saved to disk files, which can be quickly loaded into the radio for different circumstances.

Some of the features include:

- Intuitive editing grid for entering, modifying, and deleting memories
- Read and write memory channels directly to/from an ICOM 7300
- Save and load memory channels to/from disk
- Disk files are in a comma delimited format so they can be edited in other applications (ex: Excel)
- Rearrange memory channels using cut/paste and drag/drop
- Customization of the grid column layout
- Set the radio's clock every time ICOM 7300 Memory Manager starts
- User's manual included

There is a free version and a 'professional' version with only a few more features.

https://kb3hha.com/LiteEdition

Remote operation on your wish list?

Welcome to **wfview**! wfview is an open source (free) program that allows many modern Icom ham radio transceivers (such as the IC-7300, IC-9700, IC-7610, IC-R8600, the IC-705, and many others) to be controlled via a computer. Some of the features of wfview:

- shows the gorgeous spectrum display on whatever display is connected, including projectors, touch screens, and TVs.
- allows for full radio control from a computer keyboard and basic control from a numeric keypad.
- can run on hardware ranging from the $35 Raspberry Pi to laptops to desktops.
- supports rig control over ethernet/wifi as well as over the traditional USB serial CIV bus.

The project's goals are simple: Develop a free and open-source program for ham radio and SWL users to enjoy using modern radios on modern operating systems, free of charge, and with open source code.

wfview development started in 2016, by Elliott (W6EL) as a simple way to view the waterfall on linux, for the purpose of displaying these data on large screens. Since then, it has evolved to support a number of radios, and it has gained considerable functionality (including network connections) thanks to a growing group of enthusiastic developers. wfview is, quite simply, a program that we (the developers) all wanted to use, and as such, it has grown rapidly as we continue to pour our ideas into the roadmap.

As of March 2021, the following radios have been tested and are known to work well (these are our "target" platform radios):

IC-705, IC-7300, IC-7610, IC-R8600, IC-7850, and IC-9700

We are also working to provide full support for the Icom IC-R8600 SDR receiver.

wfview has code to support the following additional radios on a best-effort level. Obviously, many of the more modern features (such as the waterfall display) are not available on these older radios:

IC-706, IC-7100, IC-7600, IC-7700

There are several videos on the website that demonstrate the program's functions.

https://wfview.org/

~ *John VE7TI*

VE7SL's Radio Notebook

Steve McDonald VE7SL

Single-Yagi EME

After being absent from 2m EME (moonbounce) for the past couple of years, I decided to spark-up again this spring to see if my simple system was still up to the task.

Pretty much every month, during the moon's sweep through its northern declination, I get several days with moonrises right out in front of the house overlooking Georgia Strait. This is the large body of saltwater separating the British Columbian mainland (and the rest of North America) from Vancouver Island to my west.

Having an 'over the ocean' moonrise offers several advantages for me as it pretty well guarantees an extra 6db minimum of system gain (both on transmit and receive modes) and provides a noise-free environment for the antenna to look into.

Because of this advantage I've been able to get away with a very minimal system consisting of a single 9el Yagi and a small FM 'brick' amplifier which yields around 120W of output. The antenna is tower-mounted at 60' and controlled in azimuth only. Without being able to track the moon as it rises, the Yagi is broad enough to give me about 2 hours of moon-time on each session before I start to lose signals. With most EME stations using four or more Yagis and high power, most of the heavy-lifting on my two-way work is being done by the other station. With the extra sea-gain here, my single 9el Yagi performs more like an array of four similar Yagis.

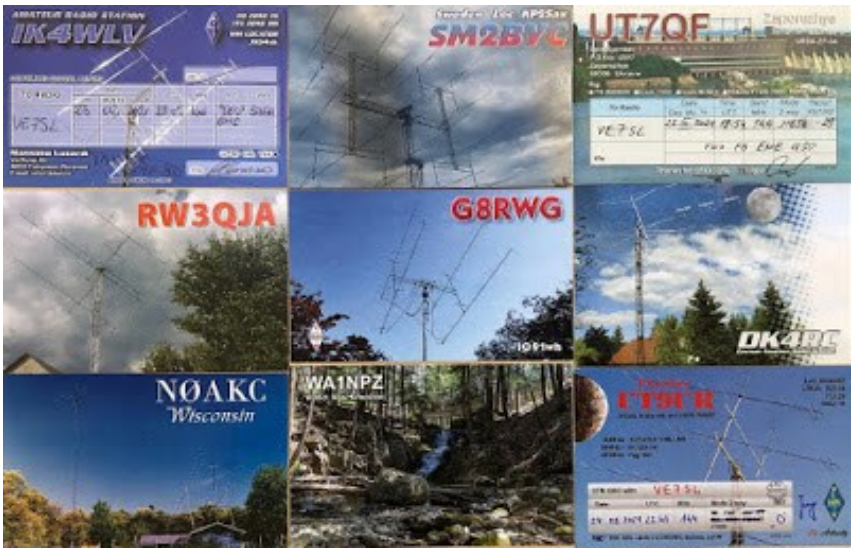
There always seems to be new stations to work whenever I get on the band and this spring was no exception. All told, I had 20 contacts, with 12 being new 'initials', bringing my total initials count to 130. The remaining 8 contacts were with stations I have worked previously. I was also able to add 2 new states, New Hampshire and Wisconsin, bringing my 2m WAS total to 30.

Conditions were poor to average, with one day in particular being excellent, when at one point I had a pileup of three callers!

Most of the stations contacted are always surprised to learn of my small system and comment that my station is the smallest one they have worked. I have worked a couple of two-Yagi stations over the years with one of them being worked several times.

If you haven't given single-Yagi EME a try I would encourage you to test it out as you might be surprised at your results. Even without the added sea-gain, many of my contacts were loud enough to be easily workable with 6db less gain… and there are dozens of big capable stations out there just waiting for new initials!

~ Steve VE7SL



Here are the cards that have arrived so far for this spring's session:

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Ham Leftovers...

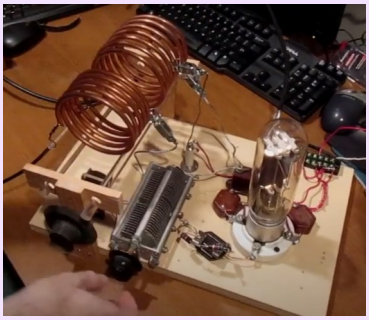
Local DMR repeaters

There are now many DMR repeaters in the Lower Mainland and you might ask, "What is DMR?" Well, DMR, which is short for Digital Mobile Radio, is a published standard for digital voice communications utilizing TDMA technology. It is one of many digital modes used on Amateur Radio VHF and UHF frequencies. It has many features, the main one being that any traffic can be cross-connected to any other station in the world through the Internet. Read all about it at https://hamradiocanada.blogspot.com/2015/01/dmr-faq.html

Morse Code vs Dementia

In at least some cases, once you learn the Morse Code, you can still recall it many years later, even with dementia. See https://www.tennessean.com/story/news/health/2021/04/30/couple-escapes-assisted-living-facility-military-morse-code-training/7166012002/

Hacking a transmitter - 1920s style



Back in the 1920s, when electronic breadboading often used a real wood breadboard, swiped from the kitchen in the dark of night, a limited supply of commercial electronic components inspired ham radio hobbyists to roll their own capacitors, inductors, switches, and whatever else was needed to build a transmitter.

Today, Andy Flowers, call sign K0SM, recreates early transmitters using the same techniques and components that were used back in the day, and he uses them on the air.

Andy shows how it's done in this video from the Antique Wireless Museum: https://youtu.be/55BSZutTFEs

The RF Seismograph...

I have playing with the images of the RF-Seismograph and now we can use the imagers and stitch them together creating movies. I have uploaded a 6 month portion on YouTube, it is 6 min long and correlates the RF -Seismograph propagation with the USGS data. We have data going back to 2016!

This is the data for Jul-Dec 2020 as a YouTube video: https://www.youtube.com/watch?v=micTae7hjfA

14 Common phone mistakes in ham radio

Quin (K8QS) and Tom (WA9TDD) identify 14 common mistakes ham radio operators make on phone (FM, SSB, AM) -- and what to do differently to maximize communication and boost intelligibility in amateur radio. See the video at: https://youtu.be/E-8E-ZwLkZA

More Ham News

A website for mapping propagation

HeyWhatsThat is a website for plotting RF propagation. While it may not be the most accurate process available, after all it is free, it does provide a very useable and useful profile that can illustrate how well your signal may be received, or how far your transmitter signal travels.

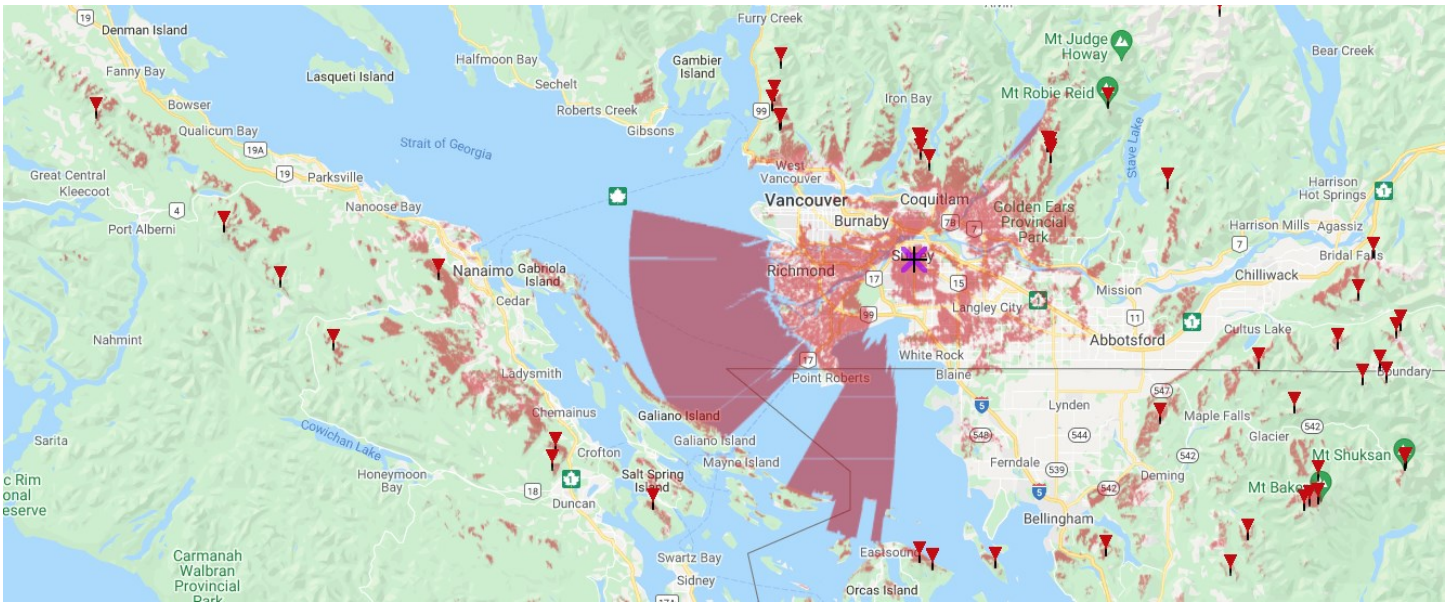
Having entered data for various repeaters in our area, the results correspond pretty well with my 'real world' experience over several decades of having used them.

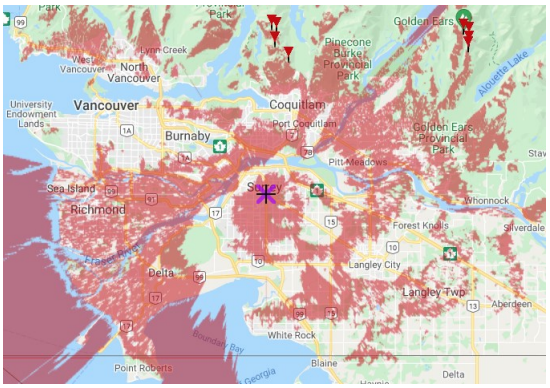
The site is pretty user friendly but I will step through the process so that you can analyze your local repeater or your own station. For clarity, the site refers to the resulting map as a 'viewshed'.

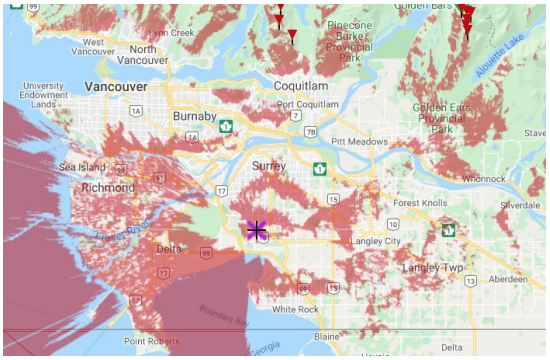
Line of sight computation

When you click on a new location, the site runs a computation on the server to determine line of sight. Please keep in mind that the profiles and viewsheds are certainly not definitive; e.g. if a user is a bit outside the viewshed you still may be able to reach them.

SARC's VE7RSC north repeater 2-meter propagation profile







Top: VE7RSC (North) repeater and below VE7RSC (South) repeater 2-meter propagation paths.

Below: The 360° earth terrain profile.

Other caveats

The site uses SRTM elevation data, which is not always ground-level. The simplest way to check the quality of data in your area is to examine the contour lines you get when you hit the Contours button in the upper right-hand corner of the map.

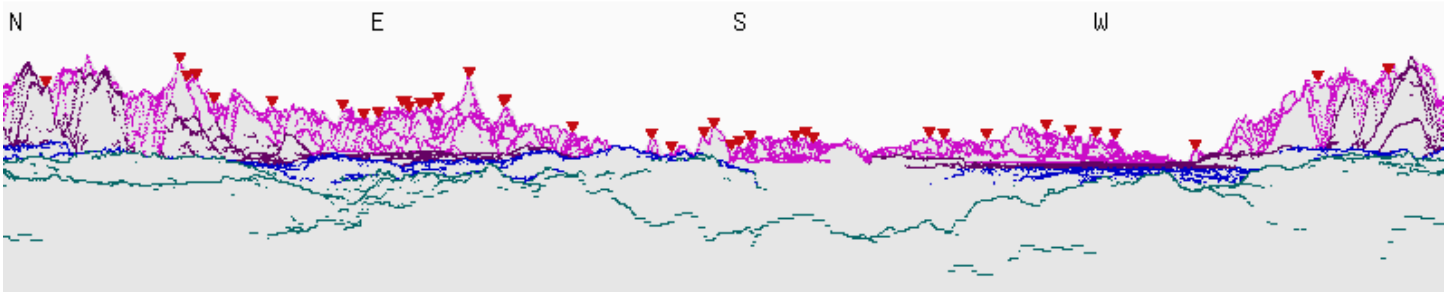
The viewsheds are computed using whatever elevation above ground you've set for the user location.

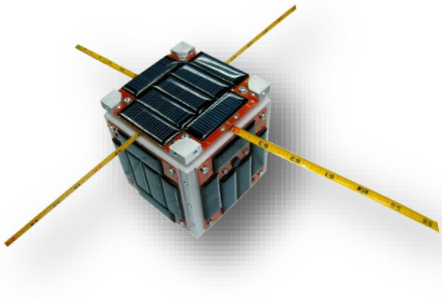
Step-by-step

1. Click on the 'new panorama' tab at he top of the page
2. Click your mouse (cursor +) on the location to be plotted, or search by entering the address or latitude and longitude coordinates on the left of the page
3. There is an option to move your cursor to the highest point within 100, 300, 1000 feet or 1, 5 or 15 miles
4. Next specify the elevation of your transmitter or accept the default of 6 feet above ground level
5. Select above ground or above sea level
6. Enter a title for your report
7. Click the 'submit request' button and wait for the report to generate
8. The result will be a page with several graphics. At the top is a rotatable view of the terrain profile by compass direction; and at the bottom is the map showing the propagation profile, the viewshed. To the right of the map are the major landmarks surrounding your location. Click on any of these landmarks for a straight line path analysis.
9. If you click on the 'Parameters' hotlink below the terrain profile window you can enter a specific frequency to evaluate.

I have profiled both SARC Surrey, BC 2-meter repeaters using the available location data. I'm sure that there may be some anomalies but, for a free service, it is a very useful tool.

~ *John VE7TI*





Satellite News

Another first in space...

The world's first wooden satellite will launch this year...

A Scandinavian cubesat will test how plywood withstands the space environment.

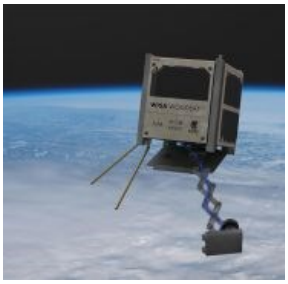
WISA Woodsat, a nanosatellite that measures 4 by 4 by 4 inches (10 by 10 by 10 centimeters) and weighs about 2.2 lbs. (1 kilogram), uses a special type of coated plywood (called WISA) for its surface panels. The wooden satellite will launch as part of a mission, designed by Arctic Astronautics, a Finnish company manufacturing cubesat kits for students. The aim of the mission is to test the behavior and durability of these plywood panels in the extreme conditions of space and assess its suitability for future missions.

The satellite will be outfitted with two cameras, one of which will be attached to a metal selfie stick, allowing the mission team to observe how the satellite's plywood surface changes in the space environment.

"The base material for plywood is birch, and we're using basically just the same as you'd find in a hardware store or to make furniture," Woodsat chief engineer Samuli Nymanm, who is also the Arctic Astronautics co-founder, said in a statement. "The main difference is that ordinary plywood is too humid for space uses, so we place our wood in a thermal vacuum chamber to dry it out. Then we also perform atomic layer deposition, adding a very thin aluminum oxide layer."

So how can a satellite made with wood survive outer space?

Aluminum oxide, a chemical compound typically used to encapsulate electronics, will help to prevent the wood from releasing any gas in the space environment, according to Nymanm. It will also protect the surface against the exposure to corrosive atomic oxygen, which can be found at the fringes of the Earth's atmosphere. This type of oxygen, created when strong UV radiation from the sun splits normal oxygen molecules, was first discovered after it damaged the thermal blankets of NASA's early Space Shuttle missions.



This atomic oxygen will likely darken the plywood panels. The satellite, however, should survive in the extreme environment, the company said in the statement.

In addition to the coating, engineers will also test various varnishes and lacquers on sections of the wood.

Aside from the two cameras, the satellite will also carry a set of pressure sensors that will monitor pressure in onboard cavities especially in the spacecraft's first days in orbit.

Read the full story: https://www.space.com/first-wooden-satellite-will-launch-in-2021

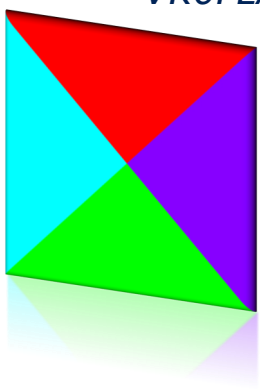
Watch the video: https://www.woodworkingnetwork.com/news/woodworking-industry-news/video-making-worlds-first-wooden-satellite

~ *Tereza Pultarova*

Foundations Of Amateur Radio

Onno Benschop
VK6FLAB

What radio should I buy as my first one?



To listen to the podcast, visit the website: http://podcasts.vk6flab.com/. You can also use your podcast tool of choice and search for my callsign, VK6FLAB.

Full instructions on how to listen are here: https://podcasts.vk6flab.com/about/help

Recently a budding new amateur asked the question: "What radio should I buy?"

It's a common question, one I asked a decade ago. Over the years I've made several attempts at answering this innocent introduction into our community and as I've said before, the answer is simple but unhelpful.

"It depends."

Rather than explaining the various things it depends on, I'm going to attempt a different approach and in no particular order ask you some things to consider and answer for yourself in your journey towards an answer that is tailored specifically to your situation.

"What's your budget?"

How much money you have set aside for this experiment is a great start. In addition to training and license costs, you'll need to consider things like shipping, import duties and insurance, power leads and a power supply, coax leads and connectors and last but not least, adaptors, antennas and accessories.

"Should you buy second hand or pre-loved?"

If you have electronics experience that you can use to fix a problem with your new to you toy this is absolutely an option. When you're looking around, check the provenance associated with the equipment and avoid something randomly offered online with sketchy photos and limited information. Equipment is expensive. Check for stolen gear and unscrupulous sellers.

"What do you want to do?"

This hobby is vast. You can experiment with activities, locations, modes and propagation to name a few. If you're looking at a specific project, consider the needs for the accompanying equipment like a computer if what you want to

explore requires that. You can look for the annual Amateur Radio Survey by Dustin N8RMA to read what others are doing.

"What frequencies do you want to play on?"

If you have lots of outdoor space you'll have many options to build antennas from anything that radiates, but if you're subject to restrictions because of where you live, you'll need to take those into account. You can also operate portable, in a car or on a hill, so you have plenty of options to get away from needing a station at home.

"Are there other amateurs around you?"

If you're within line of sight of other amateurs or a local repeater, then you should consider if you can start there. If that doesn't work, consider using HF or explore space communications. There are online tools to discover repeaters and local amateurs.

"Is there a club you can connect to?"

Amateur radio clubs are scattered far and wide across the planet and it's likely that there's one not too far from you. That said, there are plenty of clubs that interact with their members remotely. Some even offer remote access to the club radio shack using the internet.

"Have you looked for communities to connect with?"

There is plenty of amateur activity across the spectrum of social media, dedicated sites, discussion groups, email lists and chat groups. You can listen to podcasts, watch videos, read eBooks and if all that fails, your local library will have books about the fundamental aspects of our hobby.

"Have you considered what you can do before spending money?"

Figuring out the answers to many of these questions requires that you are somewhat familiar with your own needs. You need a radio to become an amateur, but you need to be an amateur to choose a radio. To get started, you don't need a radio. If you already have a license you can use tools like Echolink with a computer or a mobile phone. If you don't yet have a license, you can listen to online services like WebSDR, KiwiSDR and plenty of others. You can start receiving using a cheap RTL-SDR dongle and some wire.

"Which brand should you get?"

Rob NC0B has been testing radios for longer than I've been an amateur. His Sherwood testing table contains test results for 151 devices. The top three, Icom, Kenwood and Yaesu count for more than half of those results. This means that you'll likely find more information, more support and more local familiarity with those three. I will point out that Rob's list has 27 different brands on it, so look around and read reviews both by people who test the gear and those who use it.

And finally, "Why are you here?"

It's a serious question. Different things draw different people into this community. Think about what you like about it and what you want to do more of. Take those things into consideration when you select your radio.

As you explore the answers to these questions, you'll start building a picture of what amateur radio means to you and with that will come the answer to the question: "What radio should I buy as my first one?"

If there are other questions you'd like to ask, don't hesitate to get in touch. My address is cq@vk6flab.com. I look forward to hearing from you.

~ I'm Onno VK6FLAB

Bringing chaos into order

All podcast transcripts are collated and edited in an annual volume which you can find by searching for my callsign on your local Amazon store, or visit my author page: http://amazon.com/author/owh. Volume 7 is out now.

Feel free to get in touch directly via email: cq@vk6flab.com, follow on twitter: @vk6flab or check the website for more: http://vk6flab.com/

If you'd like to join a weekly net for new and returning amateurs, check out the details at http://ftroop.vk6flab.com/, the net runs every week on Saturday, from 00:00 to 01:00 UTC on Echolink, IRLP, AllStar Link, IRN and 2m/70cm FM via various repeaters.

If you'd like to participate in discussion about the podcast or about amateur radio, you can visit the Facebook group: https://www.facebook.com/groups/foundations.itmaze

This podcast episode was produced by Onno (VK6FLAB). You can find more at http://vk6flab.com/

One of the questions you're faced with when you start your amateur journey is around connectors. You quickly discover that every piece of equipment with an RF socket has a different one fit for purpose for that particular device.

That purpose includes the frequency range of the device, but also things like water ingress, number of mating cycles, power levels, size, cost and more.

As an aside, the number of mating cycles, how often you connect and disconnect something is determined by several factors, including the type of connection, manufacturing precision and the thickness of the plating. That said, even a so-called low cycle count connector, like say an SMA connector lasting 500 cycles will work just fine for the next 40 years if you only connect it once a month.

Back to variety. My PlutoSDR has SMA connectors on it as do my band pass filters, my handheld and one RTL-SDR dongle. The other dongle uses MCX. Both my antenna analyser and UHF antenna have an N-type connector which is the case for my Yaesu radio that also has an extra SO239 which is what my coax switches have. My HF antenna comes into the shack as an F-type and nothing I currently own has BNC, but stuff I've previously played with, does.

When you go out on a field-day, you mix and match your gear with that of your friends, introducing more connectors and combinations.

Invariably you acquire a collection of adaptors. At first this might be only a couple, quickly growing to a handful, but after a while you're likely to have dozens or more. My collection, a decade's worth, which currently includes more than 25 different combinations is over a hundred individual adaptors and growing.

For most of the time these have been tossed into a little tool box with a transparent lid, but more and more as the collection and variety grew I started to realise that I was unable to quickly locate an adaptor that I was sure I had, since it had been used in a different situation previously.

In addition to coming to the realisation that the reason I couldn't find a connector was because it was still in use, I began to notice that I had daisy chains of connectors.

For example, my HF antenna has a PL259 connector that is adapted to an F-type connector with an SO239 barrel, a PL259 to BNC and a BNC to F-type adaptor. At the other end of the RG6 coax that runs from outside into the shack, the reverse happens, F-type to BNC and BNC to PL259.

If you're counting along, that's five adaptors to get from PL259 to PL259 via F-type.

At this point you might wonder why I'm using RG6 coax. The short answer is that I have several rolls of it, left over from my days as an installer for broadband satellite internet. RG6 is very low loss, robust and heavily shielded. Although it's 75 Ohm - a whole other discussion - in practice that's not an issue. What is a problem is that the only connectors available for it are F-type compression connectors. To get those to PL259 requires a step sideways via BNC.

My point is that the number of adaptors is increasing by the day.

I should acknowledge the existence of so-called universal connector kits. The idea being that you go from one connector to a universal joiner and from that to another connector. Generally these kits have around 30 connections, giving you plenty of options, but in reality more often than not, you only have half a dozen universal joiners, so your money is effectively buying you half a dozen conversions, great for a field day, not so great for a permanent installation. You could build your own collection and use something like SMA or BNC as your universal joiner, which is something I'm exploring.

To keep track of my collection, recently I started a spreadsheet. It's essentially a list showing the number and types of connections. If you make a pivot table from that you'll end up with a grid showing totals of adaptors you have.

You can use this grid to fill a set of fishing tackle boxes and all of a sudden you've got a system where everything has its own place.

If you start this process you'll quickly notice that the table only needs to be half filled, since a BNC to SMA is the same as an SMA to BNC adaptor. This leaves you space to do some fancy footwork where the bottom right hand of the triangle can fit into the top left of the empty space, but I'll leave you to figure that out.

My table also includes things like TNC and MCX adaptors, but I don't use those very often, so at the moment I'm putting them in their own box together with T-adaptors and other weird and wonderful things like FME and reverse SMA.

For setting the order, I've gone for alphabetic, but if you have a better suggestion, I'm all ears. My email address as always is cq@vk6flab.com.

What ideas have you come up with to organise the chaos that is your sprawling connector library?

~ I'm Onno VK6FLAB

RCI English section: goodbye

Canada's international broadcast service from the English language team of Radio Canada International has come to an end. Following a major budget cut by Radio Canada of some 80 per cent in 2012, the shortwave and satellite service was terminated along with the majority of staff including the newsroom and some language sections. In recent years, only Chinese (Mandarin), Arabic, and Spanish remained along with English and French. See the full story at: https://www.rcinet.ca/en/2021/05/14/rci-english-section-goodbye/

KB6NU's Column

Dan Romanchik, KB6NU

Make amateur radio club nets fun

If your club owns a repeater, or has access to one, your club should have a weekly net. These nets inform members about club events, provide a forum for club members to get help with any technical problems they may have, build camaraderie among club members, and are just fun. At least they should be fun.

Too often, these nets turn out to be a drudge-fest. Net controls slog through a list of check-ins, who dutifully say when called upon, "No traffic." If your net is like this, you're missing an opportunity.

When I'm net control, I like to get personal to get people talking. When I call a station, I'll say things like, "Next is W8ABC. How's life in your part of town tonight, Joe?" or "What are you up to tonight, Sam?" or "How's that antenna project coming, Don?" or "Worked any DX lately, Steve?" If someone has joined the net from outside our local area, I'll say something like, "K8XYZ, you're our DX station tonight. How are things in your part of the world?"

When he's not trying to figure out which way current flows, Dan blogs about amateur radio at KB6NU.com, teaches ham radio classes, and operates CW on the HF bands. Look for him on 30m, 40m, and 80m. You can email him at cwgeek@kb6nu.com.

Often, I'll continue a conversation by asking a question about a topic brought up by a previous station. For example, if one guy says that he's having tacos for dinner, I'll ask the next person what they're having for dinner or what kind of tacos they like.

To get people to show up in the first place, make sure that your club members know about the net. An announcement should be in every club newsletter, and if your club has a mailing list, send out an email announcement every week. People are busy, and things like this can often slip through the cracks. After the net, reply to the announcement email with a list of who checked in and what you discussed. If someone sees that their buddy checked in to a net, they are more likely to check in the next week. Similarly, if they see that a topic of interest was discussed, they might join the net next week to chime in on the topic.

You might try doing some different things, too. For example, before this week's net, one guy asked if he could try sending an SSTV image over the repeater during the net. What a great idea! I, of course, said yes. On his first transmission, this guy mentioned that he was going to try this at the beginning of the second round and then pointed people towards an app—Robot36—that they could download to their Android phones. I downloaded Robot36 to my Android phone, and on his second transmission, I was able to copy the image. That was something different and fun. I'm thinking that we might even try RTTY or some other digital mode in the future.

I think you get the idea. Making a net fun will draw members, and more members means more fun. I think it's working here in Ann Arbor. Last Monday's net had 17 check-ins and a run time of 70 minutes.

Now, tell me how you make your club net fun.

~ Dan KB6NU

No-Ham Recipes

Dorothy Bishop
VK2DDB

Chocolate Fudge Cake

"This one was passed on from my mother-in-law who used to cook for nine plus a few blow-ins who'd arrive just in time for dinner. It is very old! Well, the old girl would have turned 115 this year and was married at 19."

After a meal where chocolate fudge cake was served, Dot's family would disappear to the kitchen, ostensibly to clean up. "The washing up? The plates, pans and other items used for the cake? There was no washing up going on! The remaining cake would be eaten up and evidence licked off fingers. Boys!" recalls Dot with a wry grin.

- 4 ounces (cup or 125 ml) margarine
- 4 tablespoons (60 ml) cocoa
- 1 teaspoon (5 ml) baking soda
- 3 cups (750 ml) self-raising flour
- 1 teaspoon (5 ml) vanilla
- 2 cups (500 ml) sugar
- 1 cup (250 ml) milk
- 2 eggs
- 1 cup (250 ml) boiling water

To make your own self-raising flour, add 1½ teaspoons (7.5 ml) baking powder to 1 cup (8 ounces or 250 ml) all-purpose wheat flour. Place in a jar, put a tightly fitting lid on, and shake the mixture well. Kept dry and cool, this mixture will last many months. For Dot's recipe below, add 1½ tablespoons (15 ml) baking powder to 3 cups all-purpose wheat flour.

Preheat oven to 350F (180C or a very moderate oven)

Butter two 8 by 2 inch (20 cm x5 cm) baking pans. Cream together the margarine and sugar. Beat eggs with fork and add to sugar mixture. Dissolve the baking soda in the milk and add to the sugar mixture. Sift the cocoa and the flour together over the sugar mixture. Add the vanilla to the boiling water, then briefly mix it with the other ingredients and pour into baking pans.

Bake layers for 45 to 50 minutes or until a toothpick inserted comes out clean.

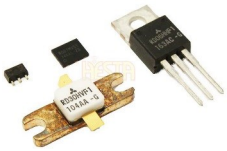
Serve warm, in slices, with ice cream or custard or both and, a good dollop of cream.

Back to Basics

John Schouten VE7TI

From The Canadian Basic Question Bank

The difference between bipolar and field effect transistors



Several issues ago we looked at vacuum tubes. But both bipolar and field effect (FET) transistors are also included in the Canadian Basic Amateur Radio Question Bank (RIC-7), and together could comprise about 5% of your final exam score, so they shouldn't be ignored. For example, here are two of the questions:

B-4-3-7 The two basic types of bipolar transistors are:

A. diode and triode types

B. varicap and Zener types

C. P and N channel types

D. NPN and PNP types

B-4-4-2 A semiconductor having its leads labelled gate, drain, and source is best described as a:

A. field-effect transistor

B. gated transistor

C. bipolar transistor

D. silicon diode

A bipolar junction transistor (BJT) is not suffering from some type of disorder… it is a type of transistor that uses both electrons and electron holes as charge carriers. In contrast, a unipolar transistor, such as a field-effect transistor, uses only one kind of charge carrier.

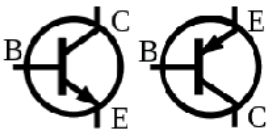
Let's first look at bipolar transistors

The bipolar point-contact transistor was invented in December 1947 at the Bell Telephone Laboratories by John Bardeen and Walter Brattain under the direction of William Shockley. The junction version known as the bipolar junction transistor (BJT), invented by Shockley in 1948, was for three decades the device of choice in the design of discrete and integrated circuits. Nowadays, the use of the BJT has declined in favor of CMOS technology in the design of digital integrated circuits.

Bipolar transistors are current-controlled and operated devices, meaning that a much smaller base current causes a larger current to flow from emitter to collector. Transistors can amplify current, voltage

or power. In its most common emitter configuration, a BJT will naturally amplify current, but when integrated into a circuit, it can easily be made to amplify output voltage *[In one RIC-7 question it points out that a transistor can amplify current, voltage or power but NOT resistance]*. Therefore, bipolar transistors are the basic semiconductor amplifying device, frequently used as a method of signal amplification across a broad spectrum of circuits, systems and product types.

The leads of a BJT are called emitter, base, and collector. A discrete transistor has three leads for connection to these regions. In the construction of a bipolar junction transistor, three layers of semiconductor material are sandwiched together. Depending on how these layers are arranged, we get two main 'flavours' or types of bipolar transistor - PNP and NPN.



A semiconductor is a type of material that allows a certain level of electron flow through it. It is therefore neither a true conductor nor an insulator. The overall level of conductivity for a given semiconductor material can be influenced by introducing various impurities at the manufacturing stage, in a process known as doping. By impacting on the number of electrons in the semiconductor material, doping can either increase or decrease both its conductivity and the direction of current flow from layer to layer. This will depend on the type of impurity added or removed and the way that the layers are arranged.

In a BJT, either one or two of its semiconductor layers will have been doped to increase the electron count, making it negatively charged, or N-type. On the other hand, the remaining one or two layers will have been doped with 'holes' to introduce electron deficiencies, making it positively charged, or P-type.

Depending on the type and arrangement of doped layers in the BJTs semiconductor sandwich, the direction of current flow across the BJT can be flipped. This results in two basic types of bipolar transistor construction. A PNP transistor has a layer of N-type semiconductor sandwiched between two layers of P-type material, and the reverse is true of an NPN transistor.

A bipolar transistor allows a small current injected at one of its terminals, the 'base' to control a much larger current flowing between two other terminals, making the device capable of amplification or switching *[diagram at lower right]*. This is called the bias voltage.

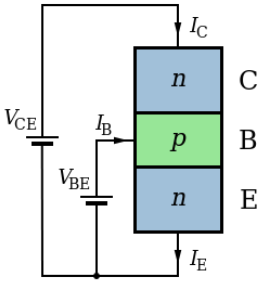
Field Effect Transistors

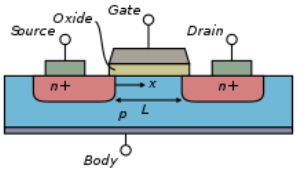
BJTs use two junctions between two semiconductor types, the so-called n-channel and p-channel. The superior predictability and performance of junction transistors soon displaced the original point-contact transistor.

The field-effect transistor (FET) is a type of transistor that uses an electric field to control the flow of current in a semiconductor. FETs are devices with three terminals. The charge enters the channel at the source, is controlled by the gate, and leaves the channel via the drain. FETs control the flow of current by the application of a voltage to the gate, which, like the base in a

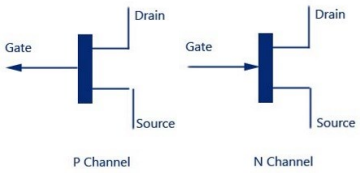
Above: Typical bipolar transistor packages

Below: The 'sandwich' of N and P type material





The FET (above) controls the flow of electrons (or electron holes) from the source to drain by affecting the size and shape of a "conductive channel" created and influenced by voltage (or lack of voltage) applied across the gate and source terminals. This conductive channel is the "stream" through which electrons flow from source to drain.



BJT or the grid in a vacuum tube, in turn alters the conductivity between the drain and source.

FETs are also known as unipolar transistors since they involve single-carrier-type operation. That is, FETs use either electrons or holes as charge carriers in their operation, but not both. Many different types of field effect transistors exist.

Field effect transistors generally display very high input impedance at low frequencies. High input impedance reduces the loading effect of the circuit. If we assume the FET has high input impedance (a combination of DC and AC resistance/reactance) from the source, the total voltage is matched to the circuit which includes the FET. If input impedance is low (like a bipolar transistor), the voltage coming from the source is divided between the FET's input resistance and internal resistance of the source, hence loading effects will occur.

Today, the most widely used field-effect transistor is the MOSFET (metal-oxide-semiconductor field-effect transistor). The concept of a field-effect transistor (FET) was first patented by Austro-Hungarian physicist Julius Edgar Lilienfeld in 1925 and by Oskar Heil in 1934, but they were unable to build a working practical semiconducting device based on the concept. This concept was refined by Bardeen, Houser, and Brattain working under William Shockley at Bell Labs in 1947, shortly after the 17-year patent expired, which led to the bipolar transistor being developed.

The first FET device to be successfully built was the junction field-effect transistor (JFET). This JFET was first patented by Heinrich Welker in 1945. Junction transistors were relatively bulky devices that were difficult to manufacture on a mass-production basis, which limited them to a number of specialized applications. By the mid-1950s, researchers had largely given up on the FET concept, and instead focused on refining bipolar transistor (BJT) technology. Through their continued Bell Labs research in the 1950s, the foundations of MOSFET technology were laid down by the work of Shockley, Bardeen and Brattain.

In 1955, Carl Frosch and Lincoln Derrick made a breakthrough when they accidentally covered the surface of silicon wafer with a layer of silicon dioxide. Through further research, the metal–oxide–semiconductor field-effect transistor (MOSFET) was invented by Mohamed Atalla and Dawon Kahng in 1959. The MOSFET largely superseded both the bipolar transistor and the JFET, and had a profound effect on digital electronic development. With its high scalability, much lower power consumption and higher density than bipolar transistors, the MOSFET made it possible to build high-density integrated circuits. The MOSFET is also capable of handling higher power than the JFET. The MOSFET was the first truly compact transistor that could be miniaturized and mass-produced for a wide range of uses. The MOSFET thus became the most common type of transistor in computers, electronics, and communications technology

In closing

Bipolar transistor integrated circuits were the main active devices of a generation of mainframe and mini computers, but most computer systems now use integrated circuits relying on field effect transistors. Bipolar transistors are still used for amplification of signals, switching, and in digital circuits.

Specialized types are used for high voltage switches, for radio-frequency amplifiers, or for switching heavy currents.

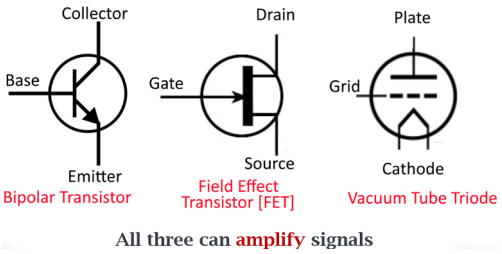
So, looking back at our sample questions,

1. The two basic types of bipolar transistors are PNP and NPN; and
2. A semiconductor having its leads labelled gate, drain, and source is best described as a field-effect transistor

For the exam, remember:

Know the matching leads on the three active components *shown above right].* The triode and the FET both rely on a reverse voltage on their control electrodes to affect the current through the device. Extreme operating temperatures can rapidly destroy semiconductor devices.

~ John VE7TI



Calling all New Amateurs: Get your Name in Lights!

Did you get your Amateur Radio certficate within the past year or two and want to introduce yourself through TCA to the Amateur Radio community? If so we would love to hear from you.

Drop a line to tcamag@yahoo.ca and tell us how you were introduced to the magic of Amateur Radio.

Do you credit any particular Amateur ("Elmer") with getting you started? Which aspect of the hobby do you enjoy so far?

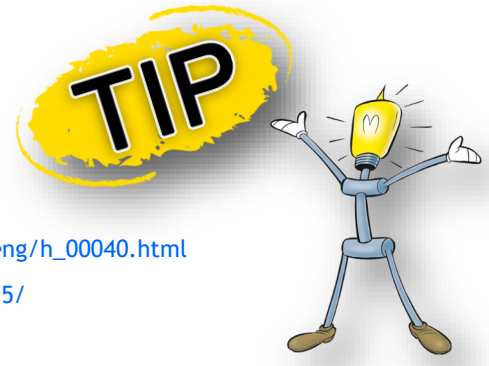
Please be sure to include your name, call sign, date and level of certificate – and don't forget to include a photo or two. We hope to hear from you soon!

Do you need more information about our courses?

https://bit.ly/SARCcourses or scan the QR-code with your smart-device camera

Study Links for more information

Whether you are new to the hobby or brushing up on skills, you should find these study links helpful:



1. RIC-7 is the entire up-to-date Industry Canada (IC) Basic Question Bank. http://tinyurl.com/CanadaBasicQB
2. Industry Canada (ISED) on-line practice page: https://apc-cap.ic.gc.ca/pls/apc_anon/apeg_practice.practice_form
3. The Amateur Radio Exam Generator is at: https://www.ic.gc.ca/eic/site/025.nsf/eng/h_00040.html
4. The ExHaminer Study software for Windows is at: https://wp.rac.ca/exhaminer-v2-5/
5. VE3YT has an excellent question-based guide available at ve3yt.com
6. There are plenty of good resources for both basic and advanced exam study courtesy of the Cold Lake Amateur Radio Society at: http://www.clares.ca/va6hal%20training.html

Contact SARC if you wish to write the Basic or Advanced Exam. If you pass we'll even give you a year free as a SARC prospective member!

Newly Licensed? When you receive your paper license in the mail, it will come with a form that can be filled out and mailed to the Radio Amateurs of Canada office, at which point an introductory RAC one-year membership will be set up. Introductory memberships are identical to our existing basic memberships and you will receive The Canadian Amateur magazine for one year.

Our next on-line course starts Monday, Sept 13 · Classroom Tuesday, Sept 14

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basic course

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7 WEEK ON-LINE or CLASSROOM COURSE

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due to high demand we have decided to offer additional courses

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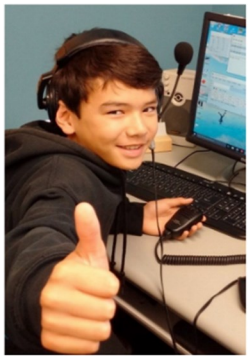

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SARC
Surrey Amateur Radio Communications
http://ve7sar.net

More information needed? Click: https://bit.ly/SARCcourses or use the QR code above

RadioSport

inverse.com

Amateur Radio Direction Finding

The website Inverse has an interesting article on Amateur Radio direction finding:

Radio direction finding has existed for nearly as long as radio itself (the late 19th century). The military uses it for practical reasons, utilizing it to 'triangulate,' or locate, hidden military bases, transmitters, and submarines that would otherwise be a secret. (The basic technique, with different technological adaptations, was used in both World War I and World War II.) Now, radio direction finding has become a sport that combines the geeky charm of ham radio, the outdoor skills of orienteering, and the endurance of cross country.

Bob Frey is an ARDF athlete who has competed since 1999 and has attended four World Championships. "It's a mental game of hide and seek," Frey tells Inverse. "There's so many parts to it. [You're thinking], Where am I? Which direction is the transmitter? Hopefully I don't get lost."

Even the best competitors will admit they do get lost on occasion. But there's something about the sport that keeps competitors coming back year after year. It's the rush of racing mixed with the pride that comes from knowing you can trust your brain under pressure.

Jerry Boyd has been an ARDF competitor since 1999 and has attended three World Championships. "If you want to compete, you have to move fast," Boyd tells Inverse. "It's thinking on the fly."

What makes Amateur Radio direction finding a sport?

To really understand ARDF, you need to know the basics of how radios work.

Radio transmitters release radio waves that are then picked up by radio receivers (the antenna used by ARDF athletes). These transmitters and receivers are usually designed to work within a pre-specified set of frequencies, measured in hertz. Two of the major ARDF competitions require tracking down transmitters attuned to one of two frequencies: 3.5 megahertz (also called an 80-meter competition) or 144 megahertz (also called a 2-meter competition).

Jerry Boyd WB8WFK proudly wears his 2m ARDF gold medal

...following any one signal with too much confidence can lead a competitor down a false trail

Each frequency creates a different flavor of competition, explains Ole Garpestad. He is the vice president of the International Amateur Radio Union (IARU), an international governing body for ham radio operators. Garpestad has been presiding over the Amateur Radio Direction Finding World Championships since the first one was organized in the 1980s.

The 3.5 megahertz competitions require receivers with large antennas[1]. Those are cumbersome to run with (people get around this by building them out of flexible materials that can move through brush, like tape measures), but they provide steady and accurate signals that make navigating easier.

"It's good for a starter," Garpestad tells Inverse. "It's even better for a fast runner."

The 144 megahertz waves don't pass through large objects and instead might be reflected around the forest. Each one of those reflections is about 60 to 70 percent accurate, but following any one signal with too much confidence can lead a competitor down a false trail. This can even happen to seasoned competitors, like Joseph Huberman, an ARDF athlete from Raleigh, North Carolina, who has competed in five World Championships.

Read more at

https://www.inverse.com/mind-body/not-sports-amateur-radio-direction-finding

~ *Inverse*

[1]*Editor's note: not all 80m receivers need large antennas. For example look at the popular RX80M made by VA7OM and sold by VA7XB, described on p. 82 and 85.*

ARDF: Foxes & Bunnies

Les Tocko VA7OM

Foxhunting – What is it?

Foxhunting is also known as Bunny Hunting, Transmitter Hunting, Radio Orienteering or ARDF (Amateur Radio Direction Finding).

ARDF is the official name and it is an activity where participants use radio direction finding techniques to locate one or more radio transmitters hidden within a designated search area. The sport originated in the late 1950s and has been most popular in Eastern Europe, Russia and China. The first world championship was held in 1980 in Poland. North America joined the world championship that was held in the former Czechoslovakia in 1990. The first formal multi-national foxhunt in North America took place in 1991.

An ARDF competition takes place on foot in diverse wooded terrain where 5 low power transmitters (less than 5 watts) are hidden. All foxes transmit on the same frequency but operate in a five-minute cycle. So, the first fox comes on the air at the precise start of each five-minute period, transmits for one minute and then shuts down. At this point, number two starts up and sends for one minute and so on.

Each fox identifies itself in Morse code with the letters MO followed by a number of dots, so the first sends MOE (one dot) and the subsequent ones send MOI, MOS, MOH and MO5 (which have 2, 3, 4 and 5 dots respectively). With this arrangement, the letters MO provide five dashes to facilitate taking a bearing and by counting the number of dots, the identity of the fox can be ascertained without the need for knowledge of Morse code.

Individuals are allowed to start at five-minute intervals so that everybody starts at the same point in the cycle. The objective is to find as many foxes as possible within an overall time limit – usually around two hours.

ARDF events usually have one day of competition using a 2-meter frequency (AM or FM modulation) and one day of competition using an 80-meter frequency (CW). The fox antennas used are omnidirectional, vertical wires on 80 meters and crossed dipoles on 2 meters.

The receivers carried by competitors use directional antennas. On 80 meters it is a ferrite or a small loop antenna and on 2 meters is a two or three element Yagi or HB9CV antenna.

A photo of Bob G3ORY at the 2m finish line, taken by Les Tocko VA7OM at the world championships in Croatia in 2010.

First generation 80m receiver designed by Les VA7OM

Second generation 80m receiver designed by Les VA7OM

Les VA7OM and his wife Sonia at the 2019 SARC fox hunt

In addition to the radio equipment an ARDF competitor usually uses a topographic map and a magnetic compass for navigation.

Other ARDF variations are known as “Sprint” and “Fox-Oring”. Sprint events have shorter courses, use lower powered transmitters in the 80 meter band which transmit in sequence for only 12 seconds with the cycle repeating every minute. The expected winning time is 15 minutes.

Fox-Oring is a variation of the sport that requires more orienteering skills. In a Fox-Oring course, the radio transmitters put out very little power, and can be received over only very short distances, often no more than 100 meters. The location of each transmitter will be indicated on the map with a circle.

The transmitter does not need to be exactly at the circle's center, but one should be able to receive its transmissions everywhere within the area indicated by the circle. A competitor must use orienteering skills to navigate to the area of the circle on the map and only then use radio direction finding skills to locate the very low power transmitter.

But overall, the side benefits of ARDF are the pleasure of being in direct contact with nature, of breathing fresh air and socializing with friends from different amateur radio clubs and societies.

This article can only give a brief description of this fascinating sport. More information can be found at:

https://www.youtube.com/watch?v=tl4HztSY8Mo&ab_channel=ARDF

~ Les Tocko VA7OM

"The original version of this article appeared in the March 2021 issue of Solid Copy, the CW Operator's Club newsletter (https://cwops.org/newsletters/).

80m transmitters built by Les VA7OM, based on design by G3ZOI

Editor's Note:

Les has announced that he plans to organize an 80m Fox-O-ring (tentatively on September 11), and other 2m events this coming summer, COVID rules permitting.

2 m fox designed and built by Les VA7OM, with firmware by Joe VE7BFK

Surrey Amateur Radio Communications Foxhunt Participants at Crescent Park 2019

SURREY AMATEUR RADIO foxhunt

HIDDEN 80M TRANSMITTER HUNT

no radio license needed

FREE EVENT • OPEN TO THE PUBLIC

SATURDAY, AUGUST 28 at 9AM

Crescent Park, South Surrey

Pre-hunt Coaching,
Registration &
Instruction 9am
FoxHunt 10am—Noon

Location See
QR Code Below

If you are a beginner and do not have an 80m receiver, come anyhow, we have loaner equipment, or we can team you up with someone experienced.

Talk-in 147.36+ (110.9 Tone)

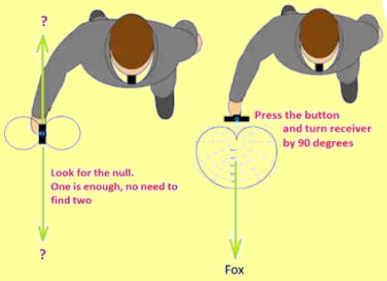
All are welcome but we ask that you RSVP to jamesadf77@gmail.com

COVID Protocols Apply

SARC
Surrey Amateur Radio Communications

The popularity of 80 m foxhunts is increasing because of the better directional characteristics (with less reflections) of HF versus 2m

The RX80M is the second generation of the popular directional foxhunt receiver designed by Les Tocko VA7OM and produced by Dave Miller VE7HR.



The RX80M receiver tunes 3.51 MHz to 3.60 MHz and is ready to use, complete with 9v battery, antenna, earbuds and internal 100 dB attenuator. Sensitivity is 0.4 uV for 10 dB signal to noise ratio.

Determine the general direction of the fox with the RX turned broadside, then home in precisely on the null using the button with RX turned sideways. An instructional video describing this technique at https://youtu.be/YK3gETNc2jU.

Now also available – low power 80 m transmitter …

TX-3 transmits a continuous 8 mW on 3.579 MHz in Morse Code – MOE (2 dashes, 3 dashes, 1 dot). Hang it from a branch and let the counterpoise dangle down or trail along the ground. The TX-3 comes with batteries, a 6 ft antenna and 6 ft counterpoise for a receive range of ~ 300 m

To order the RX or TX, contact JohnVA7XB@gmail.com.

Coming soon – higher power, programmable TX80M foxhunt transmitters

This is a non-profit volunteer project of SARC in support of amateur radio

80 m ARDF foxhunt receiver

$125 + shipping

Low Power 80 m transmitter for FoxOring or foxhunt training

$15 + shipping

July 2021

Sun	Mon	Tue	Wed	Thu	Fri	Sat
For details on all SARC events, go to ve7sar.net				1 **CANADA DAY** CONTEST: CW, phone	2 Canada Day CONTEST: CW, phone	3 Coffee: 730-930 AM @ Denny's 6850 King George Blvd., Surrey OTC Open—10-Noon
4 **US Independence Day** 	5 On-line Basic Course 19:00 hrs	6 **1930 SEPAR Net** **2000 SARC Net**	7	8	9	10 Coffee: 0730-0930 OTC Open—10-Noon 80m Foxhunt using the new Surrey transmitters ... Watershed park, Surrey
11	12 On-line Basic Course 19:00 hrs	13 **1930 SEPAR Net** **2000 SARC Net**	14 **SARC summer social evening** **1900-2100** **OTC**	15	16	17 Coffee: 0730-0930 @ Denny's OTC Open—10-Noon CONTEST: NA QSO Party (RTTY)
18 CONTEST: NA QSO Party (RTTY)	19 On-line Basic Course 19:00 hrs	20 **1930 SEPAR Net** **2000 SARC Net**	21	22	23	24 Coffee: 0730-0930 @ Denny's OTC Open—10-Noon 80m Foxhunt, Robert Burnaby Park, Burnaby
25	26 On-line Basic Course 19:00 hrs	27 **1930 SEPAR Net** **2000 SARC Net**	28 **1900 SARC Exec Meeting**	29	30	31 Coffee: 0730-0930 @ Denny's OTC Open—10-Noon CONTEST: MO QSO Party (all modes)

Contest Details: http://hornucopia.com/contestcal/contestcal.html

August 2021

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2 **BC Day** 	3 1930 SEPAR Net 2000 SARC Net **Basic Course Exam Night 18:00 hrs**	4	5	6	7 Coffee: 730-930 AM @ Denny's 6850 King George Blvd., Surrey OTC Open & Basic Course Exam—10-Noon 2m Foxhunt—Mundy park, Coquitlam
8 CONTEST: NA QSO Party (CW)	9	10 1930 SEPAR Net 2000 SARC Net	11 **SARC summer social evening** **1900-2100 OTC**	12	13	14 Coffee: 0730-0930 OTC Open—10-Noon CONTEST: WAE DX Contest (CW) MD-DC QSO Party
15 CONTEST: WAE DX Contest (CW) MD-DC QSO Party	16	17 1930 SEPAR Net 2000 SARC Net	18	19	20	21 Coffee: 0730-0930 @ Denny's OTC Open—10-Noon CONTEST: OH QSO Party NA QSO Party (SSB)
22 CONTEST: OH QSO Party NA QSO Party (SSB)	23	24 1930 SEPAR Net 2000 SARC Net	25 **1900 SARC Exec Meeting**	26	27	28 Coffee: 730-930 AM @ Denny's 6850 King George Blvd., Surrey OTC Open & Basic Course Exam—10-Noon
29 CONTEST: HI, KS QSO Party	30	31 1930 SEPAR Net 2000 SARC Net	For details on all SARC events, go to ve7sar.net			

Contest Details: http://hornucopia.com/contestcal/contestcal.html

Local Ham Gear For Sale

More listings at hamshack.ca

For sale are **Four 8' long tower sections** = 32' free standing. The bottom anchors are missing as they were left in the concrete after it was taken down. **$75.00 or best offer.**

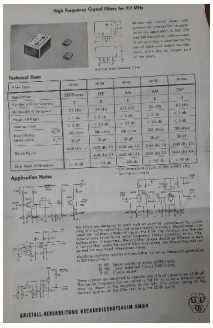
Kjeld also has a rather large Marine Radio (HF boat anchor?) sitting at his home and he'd like to find a new home for it. If you're interested contact him.

Contact: Kjeld VE7GP 604-531-6396 or VE7GP@telus.net

70 cm Fast Scan TV Transmitter

For sale is an analog fast scan (NTSC standard) ATV transmitter in a hardened and waterproof metal case. Suitable for mounting outdoors. Last used by hams at Simon Fraser University on an emergency communications project in the early 1990s. Runs on 12 VDC. Approximately 100 feet of power/antenna/control cables included. As is, but if it doesn't work to your satisfaction you can return it. **$100 OBO.**

Contact: Kevin McQuiggin VE7ZD/KN7Q mcquiggi@sfu.ca



Crystal Filters

$60 each or both for $100, plus shipping.

I have both the XF-9A for SSB TX and the XF-9B for SSB RX plus matching crystals, sockets and spec sheet. These are high quality crystal filters made in Germany. The TX is unused and the RX is like new.

I can also supply crystals to heterodyne 10-15-20-40-80 m to a 9 MHz IF using a 5 -5.5 MHz VFO. And, if you are building a receiver, I can provide 9 MHz IF transformers to match.

WANTED: **Old National Geographic and Reader's Digest Magazines.**

Contact: John VA7XB va7xb@rac.ca or 604-591-1825

A *REAL* SDR Transceiver! Flex-3000 fully SDR 100W Transceiver C$750 with FireWire card and headset adapter (laptop not included)

Great condition but rarely used now. Details at https://www.flexradio.com/documentation/flex-3000-owners-manual/

Free Oscilloscope

Early 80s solid state Tektronix scope. Has a trace, may need some work but you can't beat the price… Free

Contact: John VE7TI ve7ti@rac.ca

Radio-Active

Profiles Of SARC Members

John Brodie VA7XB

I was born in 1966 as the first of the three boys in the family in Bucharest, Romania, where I grew up and lived till 1998 when I moved to Vancouver with my wife and two children.

My dad was an electrical engineer, his specialty being power generation and transmission. He was a very technical DIY type of person, building, repairing and fixing everything around the house and I guess, one of the most fascinating experiences, as a young child, was watching him fixing the old CRT TV set. The best part was when he was testing the high voltage on the PL500 tube; he was making lightning out of thin air. Wow, something out of this world for a 5 year old lad.

Not long after, in a quiet afternoon weekend, while everybody was napping I decided to play Edison and re-discover the magic of the electric bulb. Seeing how my dad was testing for live circuits with an incandescent bulb I quickly grabbed the only thing available to me (a mere 3.5V bulb from a battery operated flashlight) hooked up two wires to the socket and straight into the wall outlet they went. Don't remember exactly what caused my parents to jump out of bed: the bang from the short or my screaming but I do remember for the sure the beating I got after that.

Not my fault my that dad didn't tell me anything about Ohm's law while he was playing with the "lightning". In some way I could consider that the moment that steered my future career path towards electricity, or electronics to be more specific.

In elementary school I joined few craft clubs, built quite a few gadgets, tinkered with few simple AM receivers and for those remembering the disco era of the 70's – 80's there was no real party without a light organ or strobe light. So, naturally I had to build some.

From a young age I also had a passion for flying and if my mom wouldn't have been opposed to the idea I would have probably ended up in military school. Unfortunately that didn't happen so the closest I came to flying was sky diving.

After graduating from high school, I passed the entry exam and got admitted to the Polytechnic

Cristian Antonescu VA7CTK

SURREY AMATEUR RADIO COMMUNICATIONS

Above: My son at the RCMP graduation ceremony with his mom.
Below: At my son's graduation ceremony with my daughter and my wife.

Institute of Bucharest, Faculty of Electronics and Telecommunications from which I graduated in 1993 with a degree in Robotics and Power Electronics.

Back in the day, in Romania the military service was mandatory for any able-bodied male so in 1986, before starting my studies at the university, I was drafted into the army where I spent the next nine months getting trained as a radar operator.

While completing my studies I started working with one of the biggest machine tool and automation equipment manufacturers in Romania (IMUAB), a move that defined my future career path. I first started with the Electronics Maintenance department, and then, as my studies progressed, I moved up the ladder and joined the electrical design team. It was an interesting and challenging work, the most I liked about it being that it wasn't a repetitive, routine job. Each machine was unique in its own way; different requirements, different electrical diagrams, different PLC program and that took the boredom out of the equation. I never saw myself working on an assembly line, for example, doing the same thing over and over again.

I met my future wife in university and by the end of the second year we got married; that was July 1989. As with most technical schools, Electronics and Telecommunications was not very appealing to the ladies, so just imagine when all students in our year met for the first time in a huge amphitheatre for an introductory presentation: 127 boys and only 5 girls. I see this girl sitting all by herself at a desk and about two years later she became Mrs. Antonescu. As with all new couples we started making career plans, thought about buying a house and car, starting a family, and whatnot.

Then, in the blink of an eye the whole society was taken by surprise; by a weird twist of fate in December 1989 the so-called Romanian Revolution happened, communism collapsed in pretty much the whole East European block and everybody's lives and perspectives were changed.

In 1991, our first child was born, a daughter, followed by a son in 1994. From a very young age my daughter showed a keen interest in computers so as she grew up she followed in her mom's footsteps. She graduated from SFU Computing Science and is presently working at Electronic Arts.

My son, on the other hand, pursued his lifelong dream of becoming a police officer and in 2017 graduated from the RCMP Academy.

While employed by the machine tool manufacturer company, work took me to few European countries, then in 1998 we decided to take a big step and start a new life half way across the world. Toronto and Vancouver were the two options we were considering, finally the balance tipped in favour of Vancouver.

In May 1998 we landed in Vancouver, which we have called home ever since.

Shortly after that I found employment with Honeywell in North Vancouver as a test engineer for their scanners for the pulp and paper industry, then few years later a new opportunity presented itself with a German CNC Router manufacturer (FlexiCAM) which just opened up an office here in Vancouver.

The 10 years I've been with them as the Tech Support director for North America were one of the most rewarding years in my career. Work took me to a lot of countries around the globe, pretty much on every continent, got to experience first-hand new cultures, new people, made new friends – just amazing.

The 2008 recession hit Flexicam as well and after a bit of a struggle the company closed the Vancouver office. This was the moment CTECH Automation was born and I've been running my own show ever since as an automation engineer dealing primarily with motion controls.

Shortly after moving to Vancouver I met Ion Marinescu, VE7NL who's been a long time member of SARC and with whom I became good friends. A common passion for outdoors and hunting took us to places I've never dreamt of before and he didn't waste any occasion to remind me about radio amateurism. For about 14-15 years now he's been on my case to get licensed as a ham operator so finally this April I accepted the challenge; he handed me over a study book and about 2 weeks later I get my call sign VA7CTK.

Being awarded the call sign also brings the privilege of becoming a new member of the SARC family.

I know as a greenhorn I have a lot of catching up to do, so I am devoting most of my spare time to setting up my shack, getting some antennas up in the attic and finally building up enough courage to push the infamous PTT button, send my first CQ into the ether then anxiously wait for a contact to acknowledge.

~

Above: Enjoying a breath of fresh air atop Fernie mountain with my old hunting partner.

Below: Reviewing the results of the day "Field Day"

Pacific North West DX Convention 2021:

Al K7AR, Convention Chairman reports, "the WVDXC will be holding a one-day virtual DX convention this year on Saturday Aug 7, 2021 via Zoom. Since this is a virtual convention, all hams are welcome wherever they may be. We're using the same convention site as always pacificnwdxconvention.com

"We're currently looking for speakers to fill the Saturday slots. We'll have prizes to give away as usual, but no raffle, and no large heavy prizes, since the WVDXC will have to ship all prizes to the winners. I'm 'really' looking forward to visiting Spokane for the 2022 convention but for this year let's get together on Zoom. Please make sure your club members are aware of this and they are welcome to register. By the way, registration is free, so very easy to do."

SURREY AMATEUR RADIO COMMUNICATIONS

The OTC Report

John Brodie VA7XB

Back on the air!

This is being written 5 days before Field Day. It's been a whirlwind of activity over the past 6 weeks following the announcement in May that we were finally able to access our new home at South Fraser Search and Rescue building after a 1½ years hiatus. It seemed like ample time for us to set up a radio room but the list of tasks to be done never seemed to get shorter as we moved closer to the goal of having 2 stations fully operational by Field Day (June 26-27).

The new Operations Training Centre location

Here are some of the challenges we faced and what has been accomplished. Fortunately, a good response of SARC and SEPAR members has allowed us to schedule Saturday morning work parties and get the needed tasks completed on time. We thank those members who willingly came out to take on the various chores.

To begin with, we couldn't even access our equipment because of the large number of items crammed into our storage space. We had to give away several chairs and computer work stations just to get to the back of the storage container.

Erecting a suitable tower and beam was one of the first tasks, the original plan being to install a self-supporting tower at the site; this did not materialize because of the high municipal fees and onerous siting requirements imposed by the City Planners.

We took instead a more expedient approach by electing to use our standby 50' portable tower. Even that posed problems for placement of guy wires and deployment of a tri-band (10—15—20m) beam antenna, given difficult site constraints.

SURREY AMATEUR RADIO COMMUNICATIONS

So that we had space for erection of the beam on the ground and on the tower, the City helped by knocking down small trees and a blackberry patch, the latter which required additional manual clearing by our volunteer crew. A 2m/70cm vertical antenna sits atop the beam. Subsequently, a temporary ground has been connected to the base of the tower for lightning protection.

Our facility is located on a densely treed lot, with virtually none of the large trees suitably placed for a wire antenna. Again, a compromise was required and we were able to utilize one 80 ft. fir and a parking lot light pole to hang an off-centre-fed dipole which will serve for 80 and 40m. Not an ideal configurations as one end is only 25 ft off the ground, but it will get us on the air. 160m is currently not feasible.

The radio room itself is compact, with room for 2 stations plus a filing cabinet and equipment rack housing our triplexer/diplexer, UPS and power distribution. Coax from the antennas and rotator enters through an access port installed for that purpose. The City had previously installed two 208v and two 110v circuits, complete with provision for plugging in external generators in the event of a power failure. For our part, a continuous ground bus for bonding of radio equipment was created inside the radio room connected to the electrical service ground and (soon) an RF ground.

Our system, when complete, is designed to operate without external power. All radio equipment runs on 12v from large AGM batteries, kept fully charged by a 208v power supply. Computers, monitors and antenna rotator operate off 208v and a UPS. When needed, external generators will keep everything functioning. A router and switch provide cable internet access. Unfortunately, we are unable to have full Internet service as the system provided by the City of Surrey has some critical ports blocked. We hope to remedy this soon, but it won't happen in time for Field Day (this means for example, that spots off the cluster will not be available).

The two radios are an Icom 7610 plus Expert Linear 1.5kw amplifier, and a Flex 6600 software defined radio. A Green Heron RT-21 controller turns the beam. Field Day will be our first test of the new installation. Did I mention that in our shared space is a kitchen, washrooms, meeting space and a lounge. Thank you to Surrey Fire and the City for making this facility available and getting it ready for SARC and SEPAR.

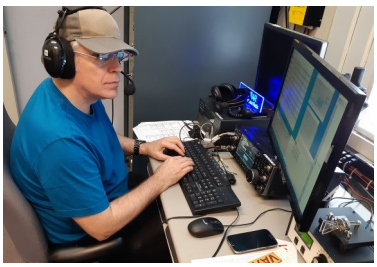
~ *John VA7XB*

SURREY AMATEUR RADIO COMMUNICATIONS

SARC-SEPAR Field Day 2021

John Schouten VE7TI

Still not 'normal' but a great effort



Despite the record breaking heat wave and the rules governing COVID, Surrey Amateur Radio Communications (SARC) and the Surrey Emergency Program Amateur Radio (SEPAR) managed a strong Field Day 2021 showing.

The approach this year was to participate in two locations and to submit the combined scores according to the ARRL amended COVID rules. The new SARC and SEPAR Operations and Training Centre (OTC) and SEPAR trailer were each activated with one radio position, operating as class 1D and 1E respectively.

At the OTC there was a choice of using the tower-mounted TH7 HF Yagi or the long wire 40/80 dipole while at the trailer a Near Vertical Incident Skywave (NVIS) antenna was strung. The NVIS antenna was used to capture contacts up to ~700 Km away. These contacts are often missed when running the OTC antennas.

While visitors were limited due to COVID precautions, we did receive support and recognition from Surrey City Council with proclamation of Surrey Amateur Radio Week June 20-27th. The proclamation is on the next page.

~ *John VE7TI*

2021 FIELD DAY
arrl.org

CITY OF SURREY
the future lives here.

Proclamation

Amateur Radio Week

June 20 – 27, 2021

WHEREAS Amateur Radio operators are celebrating over a century of the miracle of the human voice broadcast over the airwaves; and

WHEREAS Amateur Radio has provided a bridge between peoples, societies, and countries by creating friendships and the sharing of ideas; and

WHEREAS the City of Surrey has several hundred licensed Amateur Radio operators who have demonstrated their value in public assistance by providing radio communications during emergencies and public service events; and

WHEREAS Amateur Radio operators in the City of Surrey donate their services wholly without compensation, in the interest of the citizens of the City as well as the province of BC and Canada; and

WHEREAS Amateur Radio operators are on alert for any emergency, local, regional or worldwide; and

WHEREAS this year's Amateur Radio Field Day exercise will take place on June 26 and 27, 2021, this is a 24-hour emergency preparedness exercise and demonstration of Radio Amateurs' skills and readiness to provide self-supporting communications without the need for additional infrastructure;

NOW, THEREFORE, BE IT RESOLVED that I, Doug McCallum, do hereby declare June 20 - 27, 2021 as "Amateur Radio Week" in the City of Surrey.

Mayor Doug McCallum
City of Surrey

The Contest Contender

RAC Canada Day 2021

John Brodie VA7XB

It is often said that a benefit of competing in radio contests is the opportunity it provides to identify problems with your setup and an incentive to fix them before the next contest (or emergency). That was certainly the case this time as it became obvious that we have more work to do before we can claim that our equipment is fully functional at our Operations & Training Centre (OTC).

Two days before the RAC Canada Day contest, we accepted an offer to make a team effort using the official RAC callsign, VE7RAC. Because callsigns ending in RAC generate bonus points for those who complete a contact, it was expected that we would have a respectable presence on the bands.

Although equipment and antennas operated flawlessly at Field Day, the challenge of the RAC contest represented a quantum leap greater, for a few reasons. Firstly, whereas we operated only 1 station at Field Day, we elected to operate 2 radios this time. Secondly, we made the decision to operate both stations at high power.

Thirdly, we were using our triplexer/diplexer equipment for the first time at high power (as COVID came along last year just as these units were completed). Lastly, we would be simultaneously using two separate antennas that are, by necessity, in close proximity to each other.

Left from the top: VA7XB checks SWR as Steve VE7SXM and Thomas VE7TXL look on. Steve demonstrates contesting and the features of N1MM+ before Thomas jumps in to operate in run mode. Thomas did amazingly well and shows promise as a capable contester.

This combination of factors made for a different experience compared with Field Day, as we soon found that they were to give us some problems.

These problems began even before the contest started: we learned that the bandpass filter/triplexer unit did not tune properly on 15m. Disassembly of the bandpass filter revealed a broken solder joint, no doubt a result of jostling during the move-out from the old, or move-in to, the new OTC.

Shortly after the start of the contest when Steve VE7SXM was on 20m SSB using the IC-7610 and Stan VA7NF was on 40m CW using the Flex 6600 plus linear amplifiers in both cases, other issues became evident.

On several occasions, N1MM froze up and the computers had to be restarted. Then it became impossible to operate voice because of the loud intermodulation heard on the SSB radio originating from the other radio's CW.

Some quick adjustments were made to improve equipment bonding/grounding, but the only real solution was to reduce power on both radios, which helped with the intermod and PC crashes. Even so, the difficulties did not end until only one radio was operating by itself. From then on, it was smooth sailing but the disruptions cost us time and aggravation.

Nevertheless, the experience was enjoyable and we know what needs doing – improved grounding is our next priority for attention at the OTC. Surprisingly, a number of foreign stations were active in the contest, and we were able to work them. The total number of stations confirmed was 709. A new member Thomas Willms VE7TXL was able to join the team of VA7TI, VE7SXM, VA7VJ, VE7SSD, VA7NF and VA7XB to make a few Qs as an introduction to contesting.

~ John VA7XB

Right from the top: A contest strategy conference with Stan VA7NF John VA7XB and John VE7TI and stepping through some troubleshooting. Anton VE7SSD working phone and Jan VA7VJ working CW.

SURREY AMATEUR RADIO COMMUNICATIONS

General Meeting Minutes

May 12, 2021

Attendees: 28

Start Time: 7:00pm

Location: Online Zoom Meeting

Welcome & presentation of agenda

Call to Order and Introductions

John Brodie VA7XB welcomed everyone to the zoom call and asked that anyone new please introduce yourself and say hello.

- Paul Andreassen VE7NUD
- Paul Feeny VE7PTJ
- John Hummel Newell
- Eduardo Reyes VE7EJR
- Tony ?

Approval of Agenda

Gord Kirk moved to accept the agenda as presented on screen. Seconded by John Schouten. Carried

Announcements

None

Committee Reports

Financial (Scott H.)

Scott presented a financial report.

A badge order has been placed, but the ability to pick up is affected by COVID.

AGM (John Brodie)

Normally our Annual General Meeting is held in June. We still have our fiscal year end May 31st. Last year we deferred our AGM to September. SARC Directors have decided to defer it again with the hopes that we can meet in person. Wednesday Sept 8th will be our AGM date. SARC members will see the AGM attachment to this newsletter.

Memberships become due June 1st which is our year end.

SEPAR (Gord K.)

SEPAR is Surrey Emergency Program Amateur Radio https://separ.ca/

- The SEPAR mandate is to provide communications for the City of Surrey should regular communications fail.
- Field Day is a contest and a lot of fun but also an exercise in emergency communications.
- Contact VA7GK@shaw.ca for more info or to be added to the SEPAR email distribution list. Everyone is welcome to join SEPAR Zoom meetings.
- There is a weekly digital check in Net via WinLink.

OTC (Gord K.)

We are in the process of establishing a new Operations and Training Centre nearby the old City Hall Annex. The brush near the trailer has been removed near the antenna tower.

Ham Class (John TI)

The current class is wrapping up, the last instruction session was this past Monday and a review session is planned the following Monday. Exam sessions on the next two Tuesday evenings at the fire training centre.

The next class is going to start June 14th.

Communicator (John TI)

- The latest Communicator went out on May 1st. We're over 1000 downloads to date this month.
- Starting mid June will begin working on the next edition of the communicator.
- Always looking for content from your own personal experiences, projects or world wide content also needed.
- 134 countries downloading the communicator at last count.

Foxhunt (John B/Anton/Less)

The Fox hunt was supposed to be held May 8th but we've rescheduled it for Aug 28th. Subject to health guidelines at that time. Save the date!

- It will be more of a family event, picnic and fox hunting.
- Les is planning Fox-O-ring events in July/Aug (see the article in this issue).

June 9th Meeting (John B)

This is usually our AGM but will be a last minute Field Day discussion, and Ask An Elmer Meeting.

Repeaters (Steve/Gord)

No change, the intermod issue is slight and manageable. Cleaning the antenna is still tentatively planned as a small work party. We will revisit after FD

New Business

Nothing heard

Presentation

Field Day Planning Presentation (Jason B.)

- The SARC FD video from 2015 was presented https://youtu.be/4zAtFz9hcZY
- Jason presented a slide deck describing Field Day for the group. The benefits, challenges and current deployment plans to include the OTC, SEPAR trailer and your home stations with a combined club score as permitted by ARRL COVID amendments.
- The ARRL Temporary Rule Waiver was discussed.
- ICS Principles being used for planning the Field Day event.
- The Field Day Planning Committee has a virtual planning meeting every Tuesday. Please contact Jason B to join. j.w.biggin@gmail.com
- John Brodie presented some photos of the OTC and explains the jobs that we need help with on Saturday's work party. This is important to getting the OTC ready and operational before Field Day.

Adjournment

Steve McLean moved that we adjourn the meeting at 9:07pm seconded by Paul Andreassen. Carried.

~ Jeremy Morse VE7TMY

SURREY AMATEUR RADIO COMMUNICATIONS

Your SARC Membership

If you have not already renewed, your membership in SARC expired as of last June 1st.

You are requested to renew your membership prior to the next AGM, which is tentatively scheduled for September 9th.

Note that only those whose membership is in good standing may vote or be eligible to run for a Director's position.

Payment may be made in one of several ways:

1. Use PayPal on the SARC website: www.ve7sar.net
2. If we meet, bring a cheque or cash to the AGM on September 9th.
3. Mail a cheque to our Treasurer Scott Hawrelak 13935 80A Avenue, Surrey V3W 6P5

Dues are as follows:

- Individual $31
- Individual (if RAC member) $26
- Family $41
- Family (if RAC member) $36

Thankyou for taking care of this as soon as possible.

~ John Brodie VA7XB
Membership

Hamshack.ca

- Receives 12,000 or so visits per week
- Has over 500 registered users
- Usually sits at about 250 active listings as items seem to move very quickly

Most importantly, I have continued with the amateur radio club listing initiative and recently added a self-enrolment form for clubs to add their own listings on the site. In addition, living through a pandemic made me realize the important of emergency planning, and the importance that amateur radio plays in the emergency management field, by providing emergency communications services to public agencies and other organizations. Group representatives adding their organization to the site now have the ability to list the emergency communications services provided by their group.

It is anticipated that this emergency communications inventory will be accessed by public and other organizations to augment existing communications capacity for inclusion in emergency management planning.

~ Don Rosberg, VE7DXE

General Meeting Minutes

June 9, 2021

Attendees: 33

Start Time: 7:02pm

Location: Online Zoom Meeting

Call to Order and Introductions

John Brodie VA7XB welcomed everyone to the zoom call and asked that first-time visitors and members introduce themselves. PJ Van Baggen VA7NY of RHE Communications and Doug Pattengale VE7CQT, who were present to help with "Ask an Elmer", did so.

Announcements

SARC Foxhunt - Aug. 28th (John VA7XB) Look for an announcement later this summer (see the article in this issue).

- This is an 80 meter event. Purchase a new receiver for $125, as described on SARC's website and this newsletter, or use a loaner.

Other Foxhunt events this summer (Les VA7OM)

- July 10 - 80m Foxhunt using the new SARC transmitters, Watershed Park, Surrey
- July 24 - 80m Foxhunt using 4 transmitters running continuously... Robert Burnaby Park, Burnaby
- Aug. 7 - 2m Foxhunt at Mundy park, Coquitlam
- Aug. 28 - 80m Surrey Club Foxhunt at Crescent Park, Surrey
- Sep. 11 - 80m Fox-O-Ring, TBA
- Contact va7om.les@gmail.com if you're able to help maintain the foxes for SARC and learn how to set them up.

Membership approval for purchase of 6 foxhunt TX (John XB)

- John Schouten moved that we purchase the 6 foxhunt transmitters from Les for $565 to cover his costs. Seconded Robert Fishwick. Carried

Summertime socials & nets (John XB)

- We usually have a social meeting during the summer months. Details will be emailed out when confirmed. Continuation of nets is also planned.
- We plan to have a parking lot sale sometime this summer to get rid of excess equipment and allow members to sell also. See the calendar this issue.
- Our AGM Sept 8th – Consider running for Director. SARC members will see the AGM attachment to this newsletter.

Committee Reports

Treasurer's Report (Scott VE7HA)

- Nothing to report, numbers wise. For the year end we are balanced to the penny. The books are currently being reviewed/audited by Pam Hamilton.

SURREY AMATEUR RADIO COMMUNICATIONS

- Name badges have been ordered. Contact scott_hawrelak@telus.net for pickup.
- Dues need to be paid before the Sept ember meeting but are actually overdue as of now and reminders will be coming shortly for those that have not paid up.

SEPAR (Gord VA7GK)

The OTC and cargo trailer mobile station are being readied for Field Day. Let Gord know at va7gk@shaw.ca if you wish to be added to the SEPAR distribution list. SEPAR's AGM is also in early Sept.

OTC (Steve VE7SXM)

- Steve - Shared some images of the OTC exterior, including the grey tower and the radio room.
- John VA7XB - Further work is required on guy wires prior to fully extending the tower. Also rotator calibration and cable clearance need to be checked.
- 9am Saturday we meet at the OTC for a work party, continuing at least until Field Day with COVID precautions.

Ham Class (John TI)

The last class is wrapping up and 80% have written the exam now. The average score is slightly higher than usual this class, and is over 87%

- The next class starts Monday, June 14
- By mid September we may be able to have a classroom course again so we are looking at Monday, September 13 for on-line and Monday, September 14 for a classroom start date.
- Antenna workshop may be possible after September also and would likely use the OTC classroom facility.

Communicator (John TI)

Work on the next edition has begun and John is asking for any articles members can contribute.

Contests (John XB)

The RAC Canada Day Contest is Thursday July 1st (starts on Wed at 5pm). The OTC will be ready for Field Day and we should be able to also participate in the RAC contest. Contact John if you wish to participate (va7xb@RAC.ca)

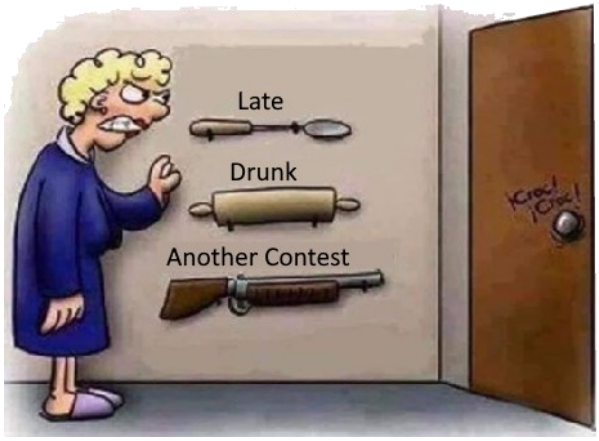
Field Day Update (Jason VA7ITJ)

Teams are working on the OTC and SEPAR trailer to be ready for the event. A media release has been prepared to promote Amateur Radio Week in Surrey. Those that have signed up to participate will be asked to firm up their scheduled time. Those working from home will be sent a guide to help with logging and score submission.

Contact j.w.biggin@gmail.com for more info or to be added to the distribution list for Field Day 2021.

New Business

None



Presentation

Ask an Elmer (moderated by Gord VA7GK)

Many questions were answered but time ran out so the decision was made to continue the meeting the following Wednesday, June 16th. The invited "Elmers" are thanked for their time and patience answering our questions.

Adjournment

Robert F. moved that we adjourn the meeting at 9:16pm. seconded by Steve M. Carried.

~ Minutes prepared by Jeremy Morse VE7TMY

Ask An Elmer Presentation

This turned out to be a very well received meeting topic and had to be continued the following week to accommodate all the questions.

While it is impossible to record all the discussions that arose for the minutes, the list of topics included:

- Building wire antennas
- The pros and cons of analog v digital radio and the most commonly used digital mode: DMR, C4FM Fusion, or D-Star?
- Explaining IRLP, Echolink and Winlink.
- Recommendations for a radio with both amateur and commercial capability, bluetooth for hands-free mic, plus GPS for use in legally communicating with logging trucks
- What is the best way to log your contacts?
- Is the 3rd prong of a standard plug sufficient grounding for a base station?
- Do changes in the ozone layer affect HF propagation and does the presence of particulate matter in the atmosphere impact wireless transmission?
- In addition to the base station radio what do I need to setup a home station?
- I'm not wanting to spend over $500 on a radio. I'm not sure I'll get into HF but certainly for emergency purposes, I'm interested in digital, and 2M & 70CM dual band radio. Ease of programming, lots of memory channels. Suggestions for the budget conscious?

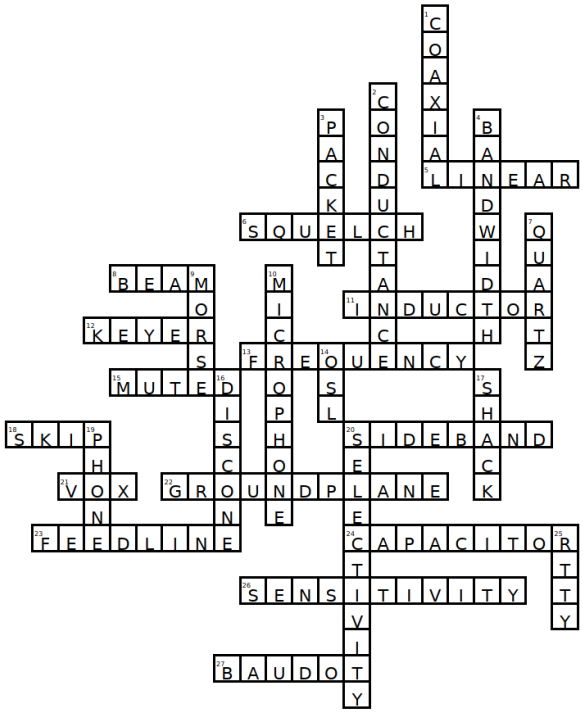
Thanks to Doug Pattengale VE7CQT for his informative DMR explanations and to 'PJ' from RHE Electronics who had a presentation on commercial radios for hams.

See the RHE presentation at: https://drive.google.com/file/d/1KlMLUkwuNBD4E5ZzSMRGaZkKw7a_8UNU/view?usp=sharing

Given the response there will be follow-up sessions.

~

Crossword answer key



SURREY EMERGENCY PROGRAM AMATEUR RADIO

SEPAR Report

Gord Kirk VA7GK
SEPAR Coordinator

An amazing year to date

We are half way through 2021 and even with the COVID-19 pandemic present, SEPAR has been busy.

The current stats show approximately 1343 hours of time volunteered in support of the program.

From net participation, both voice and digital, training courses, meetings and from a dedicated few teaching the radio licensing program many SEPAR members have been busy over the first 6 months of 2021.

Field Day this year was again a different setup. The rules allowing stations to work separately under a group did help in the planning. Just as we would have to setup during a real event, with a pandemic overlay, we set up and tested our ability to work from our recently built radio room at the Operations and Training Center (OTC) as well as the SEPAR Emergency Communications trailer.

We did have a series of events over the last couple of years that left us with substantial work required in order to get everything set up for field day.

First the original OTC room was lost as the City of Surrey, who provide it, needed to repurpose the building. It took a couple of years but they found us a new room in a shared location with South Fraser Search and Rescue. The building had new wiring installed to have it work with generators, as well as several smaller details such as additional security, getting the air conditioning serviced, etc. Outside a place was cleared for the smaller of SARC's antenna trailers, a beam was installed and the tower cranked up. From there coax from the tower did have to get over to the other side of two buildings and into the room.

Inside the room two radio stations were set up and prepared for Field Day operations.

The SEPAR trailer also required work to get it back into good working order. Just prior to the COVID outbreak the trailer was broken into. Gear including power supplies and computers were stolen. After the theft we did immediately get it working, however wiring needed to be cleaned up and new

locks installed. With the activity at the new OTC we brought the trailer over every Saturday morning and worked on getting it back to a "new" state to operate. The trailer was taken to Fire Hall 2 for Field Day and we were able to set up and run from outside the fire hall. One of the reasons to select this location was it had a good line of sight to our repeater site, which also has the BCWARN system. This allowed for us to test our portable equipment in the trailer and make sure everything was working correctly.

On Saturday afternoon the trailer had been set up and contacts had been made on HF and VHF radios in the three operator positions in the trailer. As temperatures hit 45°C late Saturday afternoon the team working to get BC WARN running did manage to get it working again and tested. After the radio room (OTC) move and the trailer break in everything was now functioning properly again. We still have some reworking of the wires in the trailer, new coax for the exterior antennas, new LED lights and a battery system to upgrade but we are again confident in the current equipment.

In addition to the Field Day planning and operation several SEPAR members have also been involved in training opportunities. Radio Amateurs of Canada (RAC) provided CANWARN weather spotting/reporting training which several of our members took part in.

As well this year the Comms Academy held in Seattle was offered virtually and again several of our members took part in the two days of excellent presentations. One in particular stood out and was the focus of a subsequent meeting to discuss within SEPAR for those who missed the event. The presentation was on earthquake preparedness and how we need to think of communities or parts of communities becoming essentially islands.

The "islands" may be created by impassible roads due to flooding, tsunami, bridges out, landslides etc. The presenter did not mean actual land surrounded by water (this could also happen) but rather pockets of the population cut off from their neighbors essentially becoming "islands" due to damage to infrastructure. The presentation encouraged emergency managers to look at their community and areas which may become isolated due to an earthquake.

The final presentation was by Tom Cox VE6TOX (who was previously local here in VE7) on "The Importance of applying ICS in Addressing the Big One". For those who do not work with ICS on a regular basis it was an excellent presentation on how, practically, ICS can be used to support all of the training and events we deal with *[Tom has the first of six ICS articles starting on page 9]*. As SEPAR continues to gain new members we will look for training opportunities to have a basic education and awareness of emergency management principles on top of our ability to operate our radio equipment.

As we begin to open up from COVID restrictions we look forward to being able to meet face to face. With the new virtual meeting tools, most are now familiar with our ability to meet this way, and will help us to continue to grow and communicate within the Surrey Emergency Program Amateur Radio.

As a reminder each week SEPAR continues to hold a VHF net on Tuesday evenings at 19:30 hours local time. The repeater VE7RSC is on 147.360+ T110.9. Come and join us and check in, we welcome all participants.

~ Gord Kirk VA7GK
SEPAR Coordinator

SURREY EMERGENCY PROGRAM AMATEUR RADIO

Van driver who used a two-way radio wins distracted driving appeal

A B.C. Supreme Court Justice has ruled in favour of a Prince George woman who appealed a conviction for distracted driving on the basis that she was using a two-way radio.

In a decision issued May 13, Justice Terence Shultes agreed with Tania Louisa Shelford that the devices are allowed for use by industry while driving.

Shelford had been driving a company van on July 2019 when an RCMP officer pulled her over and issued a her ticket after noticing her looking down at what appeared to be a phone in the centre console area. Shelford fought the ticket but a lower court justice found she was in the wrong. From there, she took the matter to the B.C. Supreme Court where, during a trial in November 2020, she provided a circular from the Superintendent of Motor Vehicles that shows two-way radios as a permitted use.

In upholding the fine, the lower court justice made the determination on the basis that the microphone was not securely fixed to the vehicle. However, Schultes found that in doing so, the lower court justice overlooked a requirement in the regulation governing the use of electronic devices while driving that a states hand microphones must be "both receiver and microphone.

Read the full story in the Prince George Citizen.

~ *Prince George Citizen newspaper*

Name	Frequency	Offset	CTCSS
VE7RSC (Primary Repeater)	147.360	+0.600	110.9
VE7RSC (Secondary Repeater)	443.775	+5.0	110.9
VE7RPT (Primary Regional Repeater)	146.940	-0.600	Optional 136.5 Rcve
Simplex 1	(VHF) 146.550		
Simplex 2	(VHF) 147.420		
Simplex 3	(UHF) 446.550		
Simplex 4	(UHF) 447.425		

Other frequencies in the Greater Vancouver area:

Primary:	Coquitlam/Abbotsford	146.430
Primary:	Inter-Municipal Group 3	146.445
Primary:	Vancouver; Mission; Sec. Coquitlam	146.460
Primary:	Kent-Mission; Sec. Richmond	146.475
Primary:	Inter-Municipal Group 2	146.490
Primary:	New West; Sec. Richmond	146.505
National	Calling / FM Simplex Group I	146.520
Primary:	North Shore; Port Coquitlam	146.535
Primary:	Bowen Island; Surrey	146.550
Intermunicipal Group 1 Coordination		146.565
Primary:	Lions Bay/Vancouver/Delta/Langley	146.580
Primary:	Port Moody; Sec: Burnaby	146.595
Secondary:	Vancouver/Surrey	147.420
Secondary:	Vancouver (UBC) / Maple Ridge	147.450
Primary:	White Rock/Chilliwack; Sec. No. Shore	147.480
Secondary:	Burnaby/Pitt Meadows	147.510
Primary:	Delta; Sec: Abbottsford	147.540
Primary:	Hope; Sec: Delta; ALSO EMBC	147.570

Surrey Emergency Program Amateur Radio

This really is QRT

John Brodie VA7XB

This really is QRT, as I will be stepping down as SARC President at the AGM to be held on Sept. 8th. In fact, since my tenure was to end at the end of this fiscal year (May 31st) I am technically no longer the President; however, for the sake of continuity I will continue until the new Board takes over and elects new officers in September. I will however continue as Director.

It has been my privilege to work with an outstanding Executive over this past year, in my opinion one of the strongest ever during the 20+ years I have been involved with SARC. Each of your Directors has something to offer and it is amazing what can be accomplished when we're all pulling in the same direction. Our newer hams originating with the basic classes are providing additional resources to swell our flourishing membership roster.

Although we were without a home for the past 18 months, that is now behind us and we are moving forward at warp speed to equip and set up our new Operations and Training Centre, where we share space with South Fraser Search & Rescue. This gives us access to meeting space, kitchens and washrooms. A handful of willing volunteers has done a remarkable job in a short space of time to clear away the storage clutter, sort through our extensive inventory, prepare the site, assemble what is needed and put it to good use in our new "Radio Room". The objective is to have it fully functional by Field Day and, at the time of writing, it appears we will have achieved that goal.

Our new facility is comprised of 2 HF stations with VHF/HF capability, a multiband wire antenna for 10-80m and a 10-15-20m beam on a 50 ft. tower topped by a VHF/UHF antenna. Using the triplexers and bandpass filters, we are able to operate at full power on 2 HF bands using the same antenna simultaneously.

Unfortunately due to COVID restrictions, we have not yet met in person many of our new members. But, like most crises, there are some positives to be found amongst the negatives. For example, COVID has allowed those who live out of the area to attend our on-line meetings and it has also given us access to presenters across North America.

SARC SOCIETY DIRECTORS 2020-2021

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John Brodie VA7XB
president at ve7sar.net

VICE PRESIDENT
Steve McLean VE7SXM
vicepresident at ve7sar.net

SECRETARY / WEBMASTER
Jeremy Morse VE7TMY
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Gord Kirk VE7GK
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Kevin McQuiggin VE7ZD / KN7Q

John Schouten VE7TI
(SARC Publications/Blog/Social Media & Courses)
communicator at ve7sar.net
course at ve7sar.net

Stan Williams VA7NF

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John Brodie VA7XB
membership at ve7sar.net

SARC QSL MANAGER
(pro tem) John Brodie VA7XB

SARC REPEATER MANAGER
VACANT
repeater at ve7sar.net

Due, it seems, to an intensified interest in emergency planning, the lockdowns have also had the effect of greatly increasing the interest in our basic ham classes, which have increased from 20-40 graduates in past years, to a number currently 10-fold larger, with the attendant benefit to SARC of the extra income generated. We also hope to offer a CW course again in September.

With relaxation of rules, our Saturday breakfasts have resumed, followed by informal gatherings at the OTC to share technical information, assist with needed tasks, or simply socialize over a coffee.

If you attended our last general meeting in June, you will be aware that several activities are planned for the summer, commencing with Field Day on June 26-27. Les Tocko VA7OM has scheduled 5 foxhunt events over the period July to September. One of these, on Aug. 28th, will be something new for SARC: a combination 80m foxhunt, barbeque and family picnic, currently in the planning stage.

We will also continue with our Tuesday night nets and plan for summer "socials" on the 2nd Wed of July and August. Then sometime in August we hope to have a parking lot sale of surplus club equipment where you can also bring personal ham items for sale.

So you can see it's shaping up to be a busy summer. We hope to see you, all of the foregoing assuming that lockdown restrictions are behind us! I would also wish that everyone is able to get out and enjoy the summer weather and family activities with optimism about the future.

~John VA7XB

Some changes have recently been made in the wording of the BC Distracted Driving laws, apparently making it more likely that drivers can be given tickets for their actions. You might want to familiarize yourself with the law at

https://www2.gov.bc.ca/gov/content/transportation/driving-and-cycling/roadsafetybc/high-risk/distracted/electronic-devices?keyword=distracted&keyword=driving specifically 'Devices allowed for use by industry or by licensed amateur radio operators'.

EXERCISE FOR PEOPLE OVER 60

Begin by standing on a comfortable surface, where you have plenty of room at each side.

With a 5-lb potato bag in each hand, extend your arms straight out from your sides and hold them there as long as you can. Try to reach a full minute, and then relax.

Each day you'll find that you can hold this position for just a bit longer.

After a couple of weeks, move up to 10-lb potato bags. Then try 50-lb potato bags and eventually try to get to where you can lift a 100-lb potato bag in each hand and hold your arms straight for more than a full minute. (I'm at this level).

After you feel confident at that level, put a potato in each bag.

It's July—August

and it's hot!

With the record-setting heat that we have been getting here on the west coast, you may want to find a cool place to read this edition of The Communicator… it's another magnum opus, so it may take you a while.

Thanks to all our contributors for making this the popular Amateur Radio 'e-zine' that it has become. We're going to take a summer break but we will be back in September.

Take care, stay cool, stay healthy, stay in touch!

SARC hosts an Amateur Radio net each Tuesday evening at 8 PM. Please tune in to the VE7RSC repeater at 147.360 MHz (+600 KHz) Tone=110.9, also accessible on IRLP node 1736 and Echolink node 496228.

On UHF we operate a repeater on 443.775MHz (+5Mhz) Tone=110.9 or IRLP Node 1737.

We are looking for a SARC Net Manager. Its not a difficult job and, if you have some time to spare, we'd like to hear from you. Basically it involves scheduling someone to do the Tuesday evening weekly net.

	SARC Net 20:00 Hrs
1st Tuesday **Standby**	Jean-Luc VA7JLU Vacant
2nd Tuesday **Standby**	Jinty VA7JMR Sheldon VA7XNL
3rd Tuesday **Standby**	Rob VE7CZV Vacant
4th Tuesday **Standby**	Kapila VE7KGK John VA7XB
5th Tuesday **Standby**	Jinty VA7JMR John VE7TI
Want a turn at Net Control? Contact the SARC Net Manager	

Down The Log…

SARC Monthly Meetings

2nd Wed. (Sept-Jun)
1900 hrs at the Surrey Fire Service Training Centre, 14923 - 64 Avenue, Surrey, BC. Here is a what3words link and map: https://what3words.com/markers.addiction.ozone

Weekly SARC Social

Saturday between 0730 and 0930 hrs at the Denny's Restaurant, 6850 King George Blvd., Surrey BC

SARC Net

Tuesday at 2000 hrs local on 147.360 MHz (+) Tone=110.9

SEPARS Net

Tuesday at 1930 hrs local on 147.360 MHz (+) Tone=110.9

VE7RSC Repeaters

2m North: 147.360MHz+ Tone=110.9Hz
IRLP node 1736
Echolink node 496228

2m South: 147.360MHz+ Tone=103.5Hz Fusion capable; No IRLP/EchoLink

1.2m: 223.960 Mhz -1.6 Tone=110.9

70cm: 443.775MHz+ Tone= 110.9Hz
IRLP node 1737

We Have A SARC Patch!

These are suitable for sewing on a jacket, cap or your jammies, so you can proudly display your support for SARC.

The price is $4 each or three for $10 and they can be picked up at a meeting or the weekly Koffee Klatch.

We thank our sponsors for their support of SARC

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